Moxa AirWorks AWK-5232 User's Manual

First Edition, October 2011

www.moxa.com/product

© 2011 Moxa Inc. All rights reserved.

Moxa AirWorks AWK-5232 User's Manual

The software described in this manual is furnished under a license agreement and may be used only in accordance with the terms of that agreement.

Copyright Notice

© 2011 Moxa Inc. All rights reserved.

Trademarks

The MOXA logo is a registered trademark of Moxa Inc.
All other trademarks or registered marks in this manual belong to their respective manufacturers.

Disclaimer

Information in this document is subject to change without notice and does not represent a commitment on the part of Moxa.

Moxa provides this document as is, without warranty of any kind, either expressed or implied, including, but not limited to, its particular purpose. Moxa reserves the right to make improvements and/or changes to this manual, or to the products and/or the programs described in this manual, at any time.

Information provided in this manual is intended to be accurate and reliable. However, Moxa assumes no responsibility for its use, or for any infringements on the rights of third parties that may result from its use.

This product might include unintentional technical or typographical errors. Changes are periodically made to the information herein to correct such errors, and these changes are incorporated into new editions of the publication.

Technical Support Contact Information

www.moxa.com/support

Moxa Americas
Toll-free: 1-888-669-2872
Tel: +1-714-528-6777
Fax: +1-714-528-6778

Moxa China (Shanghai office)
Toll-free: 800-820-5036
Tel: +86-21-5258-9955
Fax: +86-21-5258-5505

Moxa Europe
Tel: +49-89-3 70 03 99-0
Fax: +49-89-3 70 03 99-99

Moxa Asia-Pacific
Tel: +886-2-8919-1230
Fax: +886-2-8919-1231

Table of Contents

1. Introduction 1-1
- Overview 1-2
- Package Checklist 1-2
- Product Features 1-2
- Product Specifications 1-3
- Functional Design 1-3
  - LED Indicators 1-3
  - Beeper 1-4
  - Reset Button 1-4
  - Relay (Digital Output) 1-4
  - Antenna 1-5

2. Getting Started 2-1
- First-time Installation and Configuration 2-2
- Communication Testing 2-3
- Function Guiding Map 2-4

3. Web Console Configuration 3-1
- Configuration by Web Browser 3-2
- Overview 3-3
- Basic Settings 3-4
  - System Info Settings 3-4
  - Network Settings 3-4
  - Time Settings 3-5
- Wireless Settings 3-6
  - Operation Mode 3-6
  - WLAN1/WLAN2 3-9
  - Enabling Non-Redundant (Single RF) AP 3-9
  - WLAN Security Settings 3-12
  - Advanced Wireless Settings 3-19
  - WLAN Certification Settings (for EAP-TLS in Redundant Client, Client or Slave mode only) 3-22
- Advanced Settings 3-22
  - Using Virtual LAN 3-23
  - Configuring Virtual LAN 3-24
  - DHCP Server (for AP-Client operation mode's AP mode only) 3-25
  - Packet Filters 3-26
  - RSTP Settings (for Master or Slave mode only) 3-28
  - SNMP Agent 3-30
  - Storm Protection 3-31
  - Link Fault Pass-Through (for Client/Slave mode only) 3-32
- Auto Warning Settings 3-32
  - System Log 3-32
  - Syslog 3-33
  - E-mail 3-34
  - Relay 3-36
  - Trap 3-36
- Status 3-38
  - Wireless Status 3-38
  - Associated Client List (for Redundant AP, AP, or Master mode only) 3-38
  - DHCP Client List (for AP mode only) 3-39
  - System Log 3-39
  - Relay Status 3-40
  - DI and Power Status 3-40
  - Relay Status 3-40
- Maintenance 3-41
  - Console Settings 3-41
  - Ping 3-41
  - Firmware Upgrade 3-42
  - Config Import Export 3-42
  - Load Factory Default 3-42
  - Password 3-43
  - Misc. Settings 3-43
- Save Configuration 3-43
- Restart 3-44
- Logout 3-45

4. Software Installation/Configuration 4-1
- Overview 4-2
- AWK Search Utility 4-2
  - Installing AWK Search Utility 4-2

Configuring AWK Search Utility 4-4
5. Other Console Configurations 5-1
RS-232 Console Configuration (115200, None, 8, 1, VT100) 5-2
Configuration by Telnet and SSH Consoles 5-4
Configuration by Web Browser with HTTPS/SSL 5-4
Disabling Telnet and Browser Access 5-5
6. References 6-1
Beacon 6-2
DTIM 6-2
Fragment 6-2
RTS Threshold 6-2
STP and RSTP 6-2
The STP/RSTP Concept 6-2
Differences between RSTP and STP 6-3
7. Supporting Information 7-1
About This User's Manual 7-2
DoC (Declaration of Conformity) 7-2
Federal Communication Commission Interference Statement 7-2
R&TTE Compliance Statement 7-3
Firmware Recovery 7-3
Technical Support Contact Information 7-5

1

Introduction

Moxa AirWorks AWK-5232 with dual-RF wireless capability allows wireless users to access network resources more reliably. The AWK-5232 is rated to operate at temperatures ranging from 0 to 60°C for standard models and -40 to 75°C for extended temperature models, and is rugged enough for any harsh industrial environment.

The following topics are covered in this chapter:

- **Overview**
- **Package Checklist**
- **Product Features**
- **Product Specifications**
- **Functional Design**
  - LED Indicators
  - Beeper
  - Reset Button
  - Relay (Digital Output)
  - Antenna

Overview

The AWK-5232 Industrial a/b/g/n Wireless AP/Bridge/Client is an ideal wireless solution for connecting mobile equipment connected over a TCP/IP network in hard-to-wire situations. The AWK-5232 provides faster throughput than standard 802.11g devices, and at temperatures ranging from 0 to 60°C for standard models to -40 to 75°C for wide temperature models, making the AWK-5232 series rugged enough for any industrial environment. With two independent RF modules, the AWK-5232 supports a great variety of wireless configurations and applications, and the redundant wireless connections increase the reliability of the entire wireless network. The AWK-5232's two DC power inputs make the power supply more reliable, and it can be powered via PoE+ for easier deployment.

Package Checklist

Moxa's AWK-5232 is shipped with the following items. If any of these items is missing or damaged, please contact your customer service representative for assistance.

- 1 AWK-5232
- 4 Swivel-type Antennas (2 dBi, RP-SMA, 2.4 & 5 GHz)
- 1 Quick Installation Guide
- 1 Software CD
- 1 Moxa Product Warranty Booklet
- 1 Cable Holder with a Screw
- Protective Caps

NOTE The above items come with the AWK-5232 standard version. The package contents may vary in a customized version.

Product Features

- IEEE 802.11a/b/g/n compliant
- Three-in-one design (AP/Bridge/Client)
- Dual-RF design for redundant wireless communication
- Advanced wireless security:
  - 64-bit and 128-bit WEP/WPA/WPA2
  - SSID Hiding/IEEE 802.1X/RADIUS
  - Packet access control & filtering
- STP/RSTP support for redundancy of system networking
- Dedicated antenna selection
- Free firmware update for more advanced functions
- RS-232 console management
- 2DI+1DO for on-site monitoring and warming
- Operating temperature ranges from -40 to 75°C (-T model)
- Power input by redundant 24 VDC power inputs or IEEE802.3at Power over Ethernet Plus
- DIN-Rail or wall mounting ability
- IP30 protected high-strength metal housing

Product Specifications

ATTENTION

The AWK-5232 is NOT a portable mobile device and should be located at least 20cm away from the human body. The AWK-5232 is NOT designed for the general public. To safely deploy the AWK-5232s within a wireless network, a well-trained technician is required for installation.

Functional Design

LED Indicators

The LEDs on the front panel of the AWK-5232 allow you to quickly identity device status and wireless settings.

LED	Color	State	Description
Front Panel LED Indicators (System)			
PWR1	Green	On	Power is being supplied from power input 1.
		Off	Power is **not** being supplied from power input 1.
PWR2	Green	On	Power is being supplied from power input 2.
		Off	Power is **not** being supplied from power input 2.
PoE+	Amber	On	Power is being supplied via PoE+
		Off	Power is **not** being supplied via PoE+.
FAULT	Red	Blinking	Cannot get an IP address from the DHCP server (interval: 1 sec)
		Off	There is no error condition.
STATE	Green/Red	Green	Software Ready
		Blinking Green	The AWK has been located by AWK Search Utility(interval: 1 sec)
		Red	Booting or Error condition
WLAN1	Green/Amber	Green On	WLAN1 functions in **Client** mode.
		Blinking Green	WLAN1's data communication is running in **Client** mode
		Amber On	WLAN1 functions in **AP/Bridg**e mode.
		Blinking Amber	WLAN1's data communication is running in **AP/Bridge** mode
		Off	WLAN1 is not in use.
WLAN2	Green/Amber	Green On	WLAN2 function is in **Client** mode.
		Blinking Green	WLAN2's data communication is running in **Client** mode
		Amber On	WLAN2 function is in **AP/Bridge** mode.
		Blinking Amber	WLAN2's data communication is running in **AP/Bridge** mode
		Off	WLAN2 is not in use.
TP Port (LAN1, LAN2) LED Indicators (Port Interface)			
100M	Amber	On	TP port's 10/100 Mbps link is **active**.
		Blinking	Data is being transmitted at 10/100 Mbps
		Off	TP port's 10/100 Mbps link is **inactive**.

LED	Color	State	Description
1000M	Green	On	TP port's 1000 Mbps link is **active**.
		Blinking	Data is being transmitted at 1000 Mbps
		Off	TP port's 1000 Mbps link is **inactive**.

ATTENTION

When the LEDs for **STATE** (Green), **FAULT**, **WLAN1** and **WLAN2** all light up simultaneously and blink at one-second intervals, it means the system has failed to boot. This may be due to improper operation or uncontrollable issues, such as an unexpected shutdown during a firmware update. To recover the firmware, refer to "Firmware Recovery" in Chapter 7.

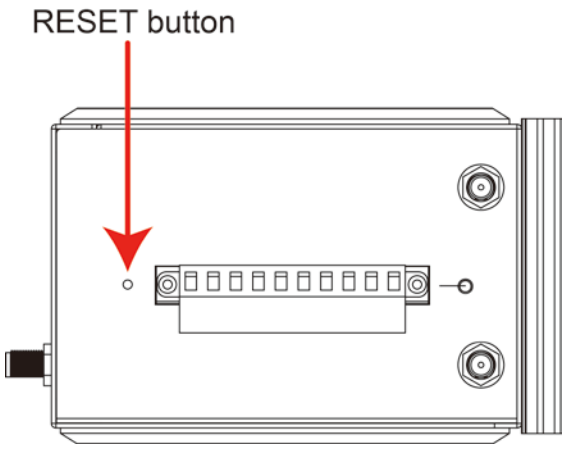
Beeper

The beeper signals that the system is ready with two short beeps.

Reset Button

The **RESET** button is located on the top panel of the AWK-5232. You can reboot the AWK-5232 or reset it to factory defaults by pressing the **RESET** button with a pointed object, like a straightened paper clip.

- **System reboot:** Hold the RESET button down for under 5 seconds and then release.
- **Reset to factory default:** Hold the RESET button down for over 5 seconds until the **STATE** LED starts blinking green. Release the button to reset the AWK-5232.



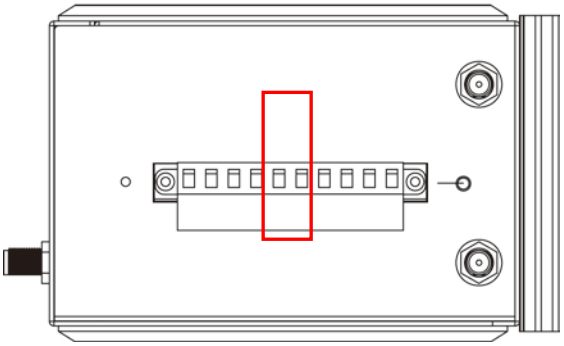
Relay (Digital Output)

The AWK-5232 has one relay output, which consists of the 2 terminal block contacts on the top panel, as shown below. These relay contacts are used to forward notifications of system failure and user-configured events.

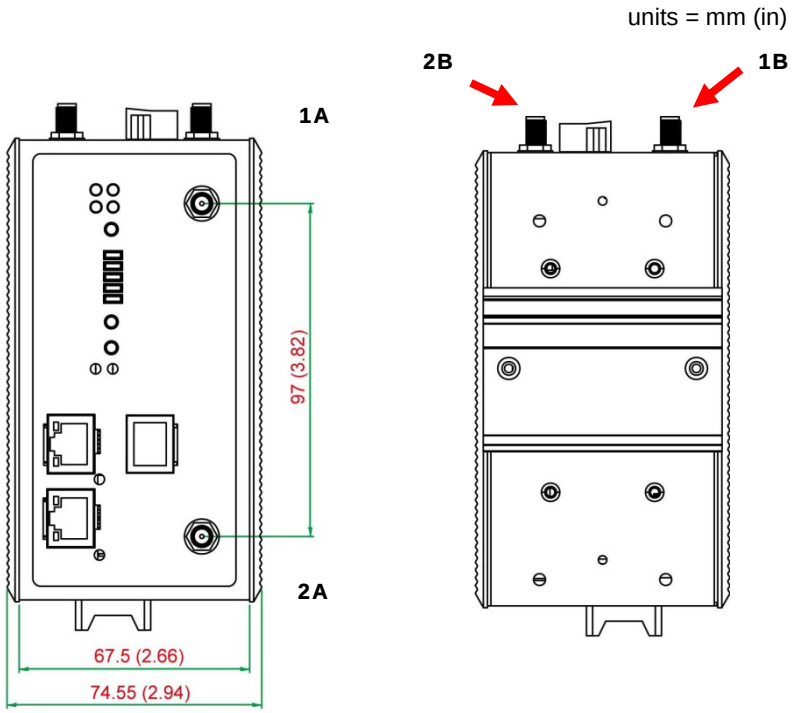
The two wires attached to the relay contacts form an open circuit when a user-configured event is triggered. If a user-configured event does not occur, the relay circuit will remain closed. For safety reasons, the relay circuit is kept open when the AWK-5232 is not powered.

The AWK-5232's relay status is summarized as follows:

Power Status	Event	Relay
Off	---	Open
On	Yes	Open
	No	Short



Antennae



The AWK-5232 supports 802.11 a/b/g/n with 2x2 MIMO technology and a dual RF solution. Antennas 1A and 1B are the MIMO antennas associated with RF1, and 2A and 2B are the MIMO antennas associated with RF2.

2

Getting Started

This chapter explains how to install Moxa's AirWorks AWK-5232 for the first time, to quickly set up your wireless network and test whether the connection is running well. With this function guide, you will gain access to the functions you need easily.

The following topics are covered in this chapter:

- **First-time Installation and Configuration**
- **Communication Testing**
- **Function Guiding Map**

First-time Installation and Configuration

Before installing the AWK-5232, make sure that all items in the Package Checklist are in the box. In addition, you will need access to a notebook computer or PC equipped with an Ethernet port. The AWK-5232 has a default IP address that you must use when connecting to the device for the first time.

Step 1: Select the power source.

The AWK-5232 can be powered by DC power input or PoE+ (Power over Ethernet Plus). The AWK-5232 will use whichever power source you choose.

ATTENTION

Do NOT use either an IEEE802.3af PoE Injector NOR a PSE (Power Sourcing Equipment). Use only an IEEE802.3at compliant PSE for PoE+ (Power over Ethernet Plus) device.

Step 2: Connect the AWK-5232 to a notebook or PC.

Since the AWK-5232 supports MDI/MDI-X auto-sensing, you can use either a straight through cable or crossover cable to connect the AWK-5232 to a computer. If the LED indicator on AWK-5232's LAN port lights up, it means the connection is established.

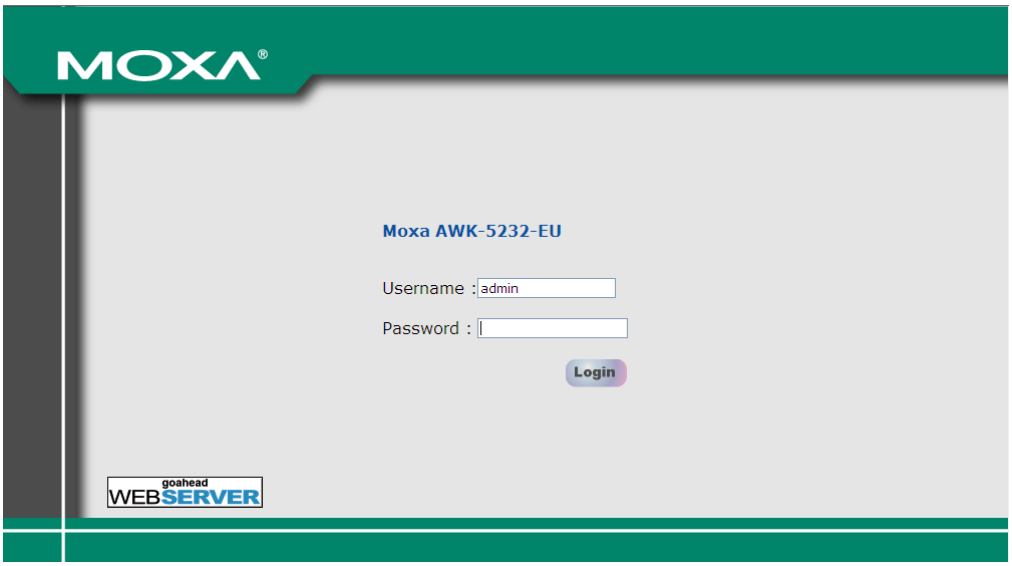
Step 3: Set up the computer's IP address.

Set an IP address on the same subnet as the AWK-5232. Since the AWK-5232's default IP address is **192.168.127.253**, and the subnet mask is **255.255.255.0**, you should set the IP address of the computer to **192.168.127.xxx**.

NOTE After you select **Maintenance → Load Factory Default** and click the **Submit** button, the AWK-5232 will be reset to factory default settings and the IP address will be also reset to **192.168.127.253**.

Step 4: Use the web-based manager to configure AWK-5232

Open your computer's web browser and type http://192.168.127.253 in the address field to access the homepage of the web-based Network Manager. Before the homepage opens, you will need to enter the user name and password as shown in the following figure. For first-time configuration, enter the default username and password and then click on the **Login** button:



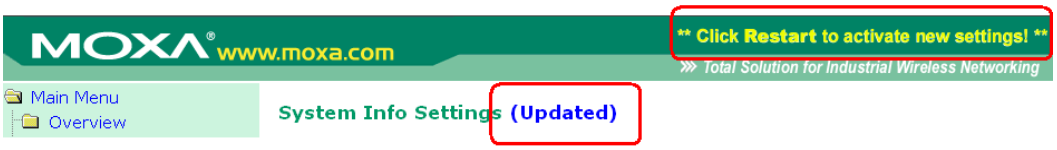
NOTE Default user name and password:

Username: **admin**

Password: **root**

For security reasons, we strongly recommend changing the default password. To do so, select **Maintenance → Password**, and then follow the on-screen instructions to change the password.

NOTE After you click **Submit** to apply changes, you can see that the web page is refreshed, and the string **"(Update)"** and a blinking reminder will be shown on the upper-right corner of web page, as follow.



To make the changes effective, click **Restart** and then **Save and Restart** after you change the settings. About 30 seconds are needed for the AWK-5232 to complete its restart process.

Step 5: Select the operation mode for the AWK-5232.

By default, the AWK-5232's operation mode is set to Wireless redundancy. You can change the setting in **Wireless Settings → Operation mode** if you would like to use the Wireless bridge or AP-Client mode instead. Detailed information about configuring the AWK-5232's operation can be found in Chapter 3.

Step 6: Test communications.

We will describe 2 test methods to make sure the network connection has been established. Please refer to the following section for more details.

Communications Testing

After installation, you can run a sample test to make sure the AWK-5232 and wireless connection are functioning normally. Two testing methods are explained in the following sections. Use the first method if you are using only one AWK-5232 device, and use the second method if you are using two or more AWK-5232s.

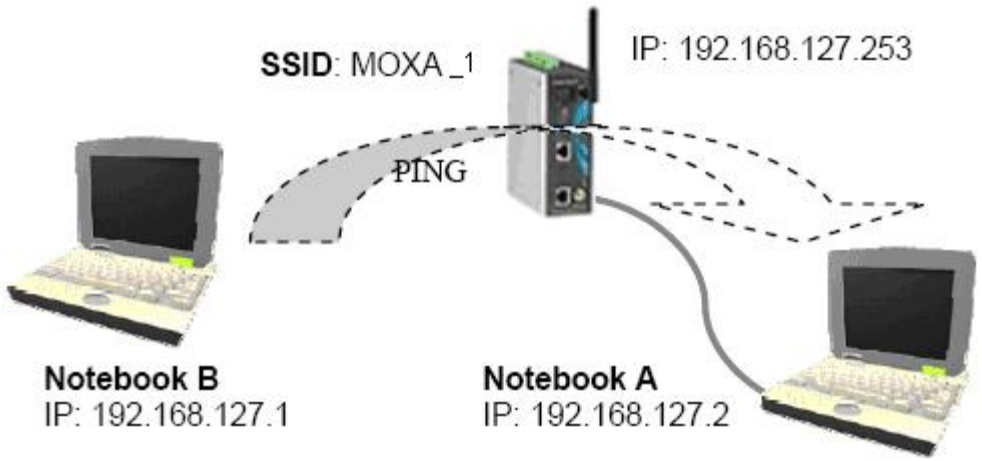
Testing Method for one AWK-5232

If you are only using one AWK-5232, you will need a second notebook computer equipped with a WLAN card. Configure the WLAN card to connect to the AWK-5232 (NOTE: the default SSID is **MOXA_1**), and change the IP address of the second notebook (B) so that it is on the same subnet as the first notebook (A), which is connected to the AWK-5232.

After configuring the WLAN card, establish a wireless connection with the AWK-5232 and open a DOS window on Notebook B. At the prompt, type

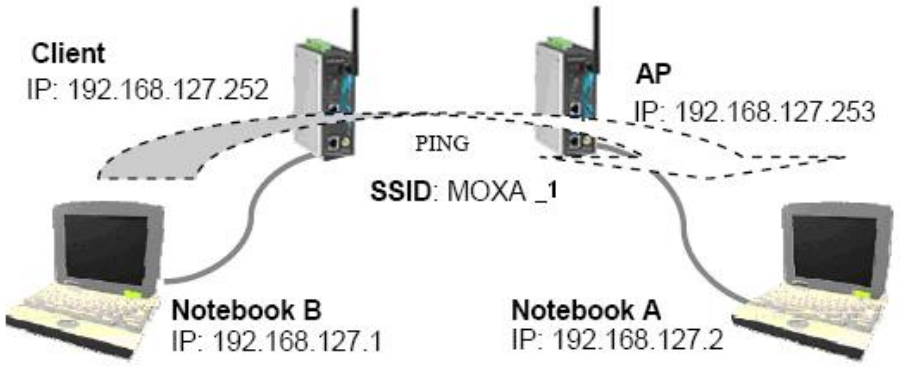
ping <*IP address of notebook A*>

and then press **Enter** (see the figure below). A "Reply from IP address …" response means the communication was successful. A "Request timed out." response means the communication failed. In this case, recheck the configuration to make sure the connections are correct.



Testing Method for two or more AWK-5232s

If you have two or more AWK-5232s, you will need a second notebook computer (B) equipped with an Ethernet port. Use the default settings for the first AWK-5232 connected to notebook A and change the second or third AWK-5232 connected to notebook B to Client mode. Then, configure the notebooks and AWK-5232s properly.



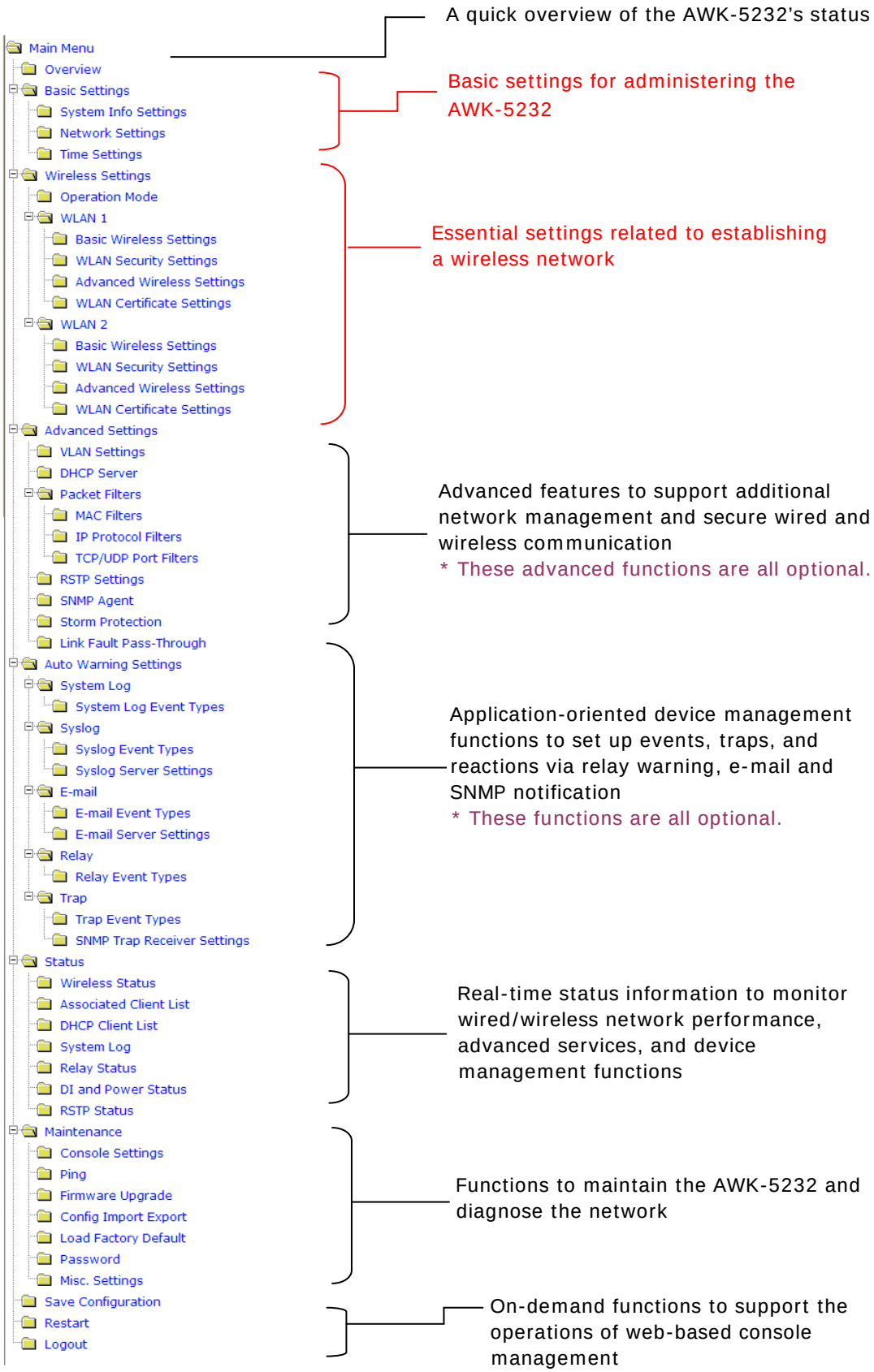
After setting up the testing environment, open a DOS window on notebook B. At the prompt, type

ping <*IP address of notebook A*>

and then press **Enter**. A "Reply from IP address …" response means the communication was successful. A "Request timed out" response means the communication failed. In this case, recheck the configuration to make sure the connections are correct.

Function Guiding Map

The management functions are categorized in a tree and shown in the left field of the web-based management console. You can efficiently locate the function you need with the following guide.


A quick overview of the AWK-5232's status
Main Menu
Overview
Basic Settings
System Info Settings
Network Settings
Time Settings
Basic settings for administering the AWK-5232
Wireless Settings
Operation Mode
WLAN 1
Basic Wireless Settings
WLAN Security Settings
Advanced Wireless Settings
WLAN Certificate Settings
WLAN 2
Basic Wireless Settings
WLAN Security Settings
Advanced Wireless Settings
WLAN Certificate Settings
Essential settings related to establishing a wireless network
Advanced Settings
VLAN Settings
DHCP Server
Packet Filters
MAC Filters
IP Protocol Filters
TCP/UDP Port Filters
RSTP Settings
SNMP Agent
Storm Protection
Link Fault Pass-Through
Advanced features to support additional network management and secure wired and wireless communication
* These advanced functions are all optional.
Auto Warning Settings
System Log
System Log Event Types
Syslog
Syslog Event Types
Syslog Server Settings
E-mail
E-mail Event Types
E-mail Server Settings
Relay
Relay Event Types
Trap
Trap Event Types
SNMP Trap Receiver Settings
Application-oriented device management functions to set up events, traps, and reactions via relay warning, e-mail and SNMP notification
* These functions are all optional.
Status
Wireless Status
Associated Client List
DHCP Client List
System Log
Relay Status
DI and Power Status
RSTP Status
Real-time status information to monitor wired/wireless network performance, advanced services, and device management functions
Maintenance
Console Settings
Ping
Firmware Upgrade
Config Import Export
Load Factory Default
Password
Misc. Settings
Functions to maintain the AWK-5232 and diagnose the network
Save Configuration
Restart
Logout
On-demand functions to support the operations of web-based console management

3

Web Console Configuration

In this chapter, we will explain each web management page of the web-based console configuration. Moxa's easy-to-use management functions will help you set up your AWK-5232, as well as establish and maintain your wireless network easily.

The following topics are covered in this chapter:

- **Configuration by Web Browser**
- **Overview**
- **Basic Settings**
  - System Info Settings
  - Network Settings
  - Time Settings
- **Wireless Settings**
  - Operation Mode
  - WLAN1/WLAN2
  - Enabling Non-Redundant (Single RF) AP
  - WLAN Security Settings
  - Advanced Wireless Settings
  - WLAN Certification Settings (for EAP-TLS in Redundant Client, Client or Slave mode only)
- **Advanced Settings**
  - Using Virtual LAN
  - Configuring Virtual LAN
  - DHCP Server (for AP-Client operation mode's AP mode only)
  - Packet Filters
  - RSTP Settings (for Master or Slave mode only)
  - SNMP Agent
  - Storm Protection
  - Link Fault Pass-Through (for Client/Slave mode only)
- **Auto Warning Settings**
  - System Log
  - Syslog
  - E-mail
  - Relay
  - Trap
- **Status**
  - Wireless Status
  - Associated Client List (for Redundant AP, AP, or Master mode only)
  - DHCP Client List (for AP mode only)
  - System Log
  - Relay Status
  - DI and Power Status
- **Maintenance**
  - Console Settings
  - Ping
  - Firmware Upgrade
  - Config Import Export
  - Load Factory Default
  - Password
  - Misc. Settings
- **Save Configuration**
- **Restart**
- **Logout**

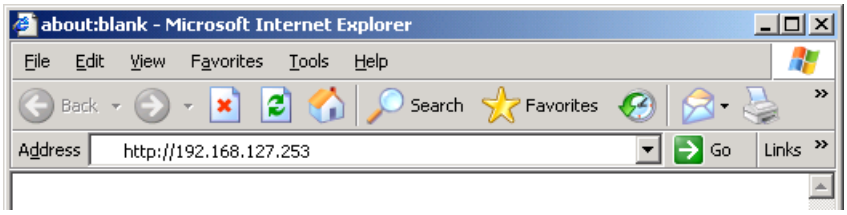
Configuration by Web Browser

Moxa AWK-5232's web browser interface provides a convenient way to modify its configuration and access the built-in monitoring and network administration functions. The recommended web browser is Microsoft® Internet Explorer 5.5 or 6.0 with JVM (Java Virtual Machine) installed.

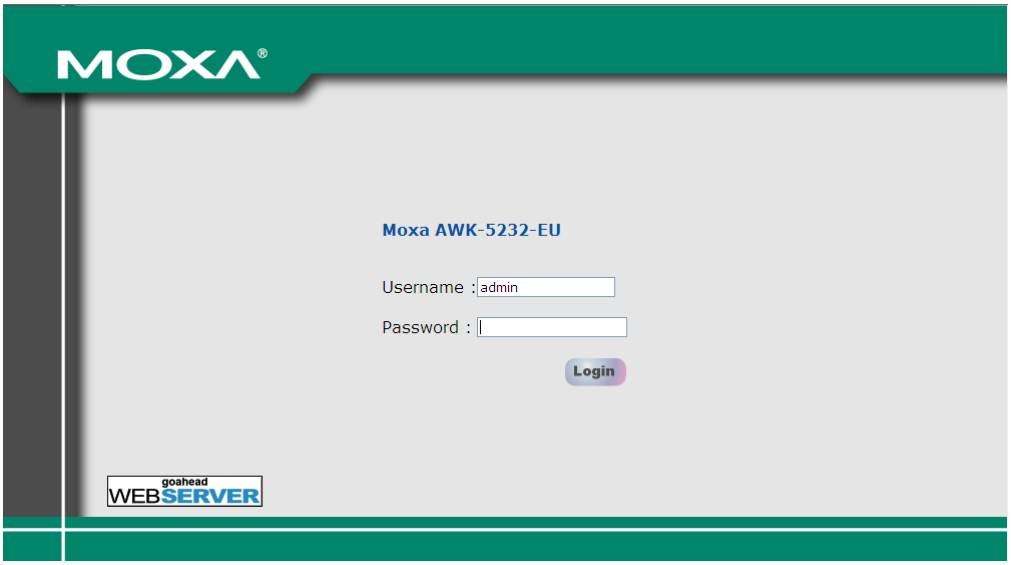
NOTE To use the AWK-5232's management and monitoring functions from a PC host connected to the same LAN as the AWK-5232, you must make sure that the PC host and AWK-5232 are on the same logical subnet. Similarly, if the AWK-5232 is configured for other VLAN settings, you must make sure your PC host is on the management VLAN.
The Moxa AWK-5232's default IP is **192.168.127.253**.

Follow the steps below to access the AWK-5232's web-based console management.

1. Open your web browser (ex. Internet Explorer) and type the AWK-5232's IP address in the address field. Then press **Enter** to establish the connection.

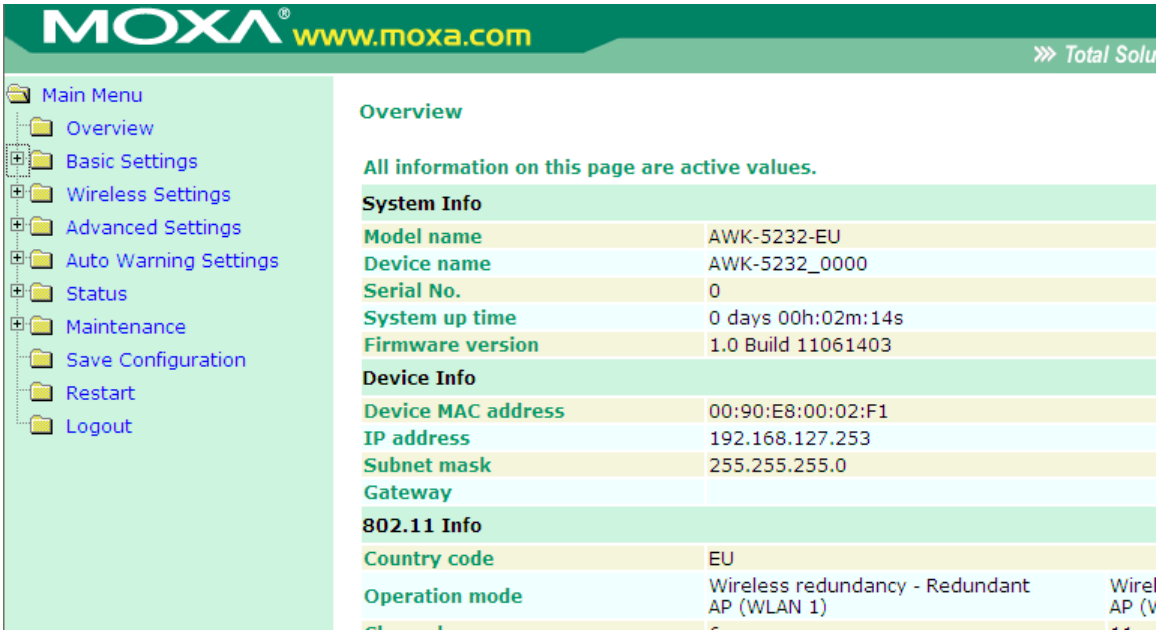


2. The Web Console Login page will open. Enter the password (Username is set as **admin**; the default password is **root** if a new password has not been set.) and then click **Login** to continue.



You may need to wait a few moments for the web page download onto your computer. Please note that the Model name and IP address of your AWK-5232 are both shown on the title of the web page. This information can help you identify multiple AWK-5232s.

You can use the menu tree on the left side of the window to open the function pages to access each of AWK-5232's functions.



In the following paragraphs, we will go through each of the AWK-5232's management functions in detail. You can also get a quick overview of these functions in the "Function Guiding Map" section of Chapter 2.

NOTE The model name of the AWK-5232 is shown as AWK-5232-XX where XX indicates the country code. The country code represents the AWK-5232 version and which bandwidth it uses. We use **AWK-5232-US** as an example in the following figures. The country code of model name on the screen may vary if you are using a different version (band) AWK-5232.

NOTE For security reasons, you will need to log back into the AWK-5232 after the 5-minute time-out.

Overview

The **Overview** page summarizes the AWK-5232's current status. The information is categorized into several groups: **System Info**, **Device info** and **802.11 Info**.

Overview

All information on this page are active values.

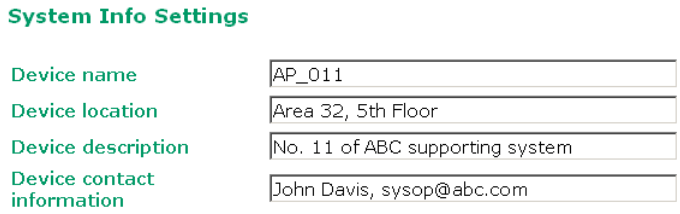
System Info		
Model name	AWK-5232-EU	
Device name	AWK-5232_0000	
Serial No.	0	
System up time	0 days 00h:02m:14s	
Firmware version	1.0 Build 11061403	
Device Info		
Device MAC address	00:90:E8:00:02:F1	
IP address	192.168.127.253	
Subnet mask	255.255.255.0	
Gateway		
802.11 Info		
Country code	EU	
Operation mode	Wireless redundancy - Redundant AP (WLAN 1)	Wireless redundancy - Redundant AP (WLAN 2)
Channel	6	11
RF type	B/G/N Mixed	B/G/N Mixed
SSID	MOXA_1	MOXA_2

Basic Settings

The Basic Settings group includes the most commonly used settings required by administrators to maintain and control the AWK-5232.

System Info Settings

The **System Info** items, especially ***Device name*** and ***Device description***, are displayed and included on the **Overview** page, SNMP information, and alarm emails. Setting **System Info** items makes it easier to identify the different AWK-5232s connected to your network.



Device name

Setting	Description	Factory Default
Max. 31 Characters	This option is useful for specifying the role or application of different AWK-5232 units.	AWK-5232_<*Serial No. of this AWK-5232*>

Device location

Setting	Description	Factory Default
Max. 31 Characters	To specify the location of different AWK-5232 units.	None

Device description

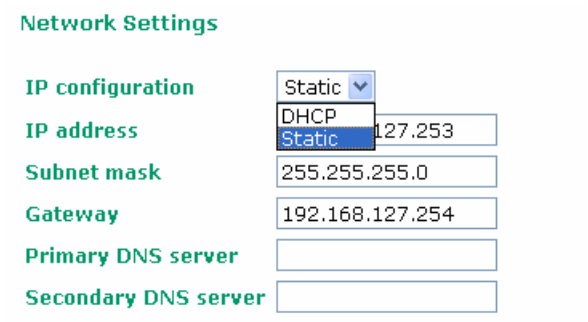
Setting	Description	Factory Default
Max. 31 Characters	Use this space to record more detailed description of AWK-5232	None

Device name

Setting	Description	Factory Default
Max. 31 Characters	To provide information about whom to contact in order to resolve problems. Use this space to record contact information of the person responsible for maintaining this AWK-5232.	None

Network Settings

The Network Settings configuration allows you to modify the usual TCP/IP network parameters. An explanation of each configuration item is given below.



IP configuration

Setting	Description	Factory Default
DHCP	The AWK-5232's IP address will be assigned automatically by the network's DHCP server	Static
Static	Set up the AWK-5232's IP address manually.	

IP address

Setting	Description	Factory Default
AWK-5232's IP address	Identifies the AWK-5232 on a TCP/IP network.	192.168.127.253

Subnet mask

Setting	Description	Factory Default
AWK-5232's subnet mask	Identifies the type of network to which the AWK-5232 is connected (e.g., 255.255.0.0 for a Class B network, or 255.255.255.0 for a Class C network).	255.255.255.0

Gateway

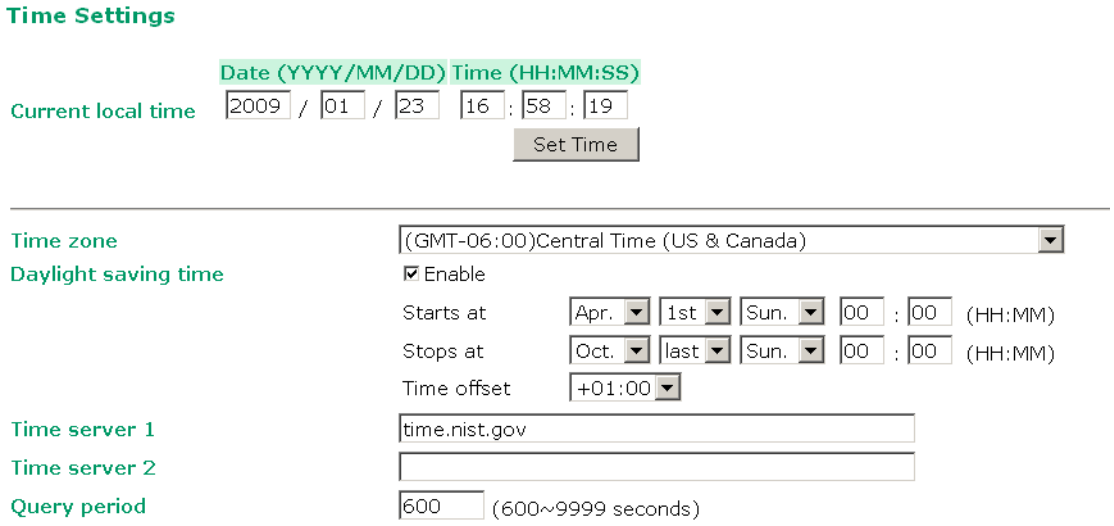
Setting	Description	Factory Default
AWK-5232's default gateway	The IP address of the router that connects the LAN to an outside network.	None

Primary/ Secondary DNS server

Setting	Description	Factory Default
IP address of Primary/ Secondary DNS server	The IP address of the DNS Server used by your network. After entering the DNS Server's IP address, you can input the AWK-5232's URL (e.g., *http://ap11.abc.com*) in your browser's address field instead of entering the IP address. The Secondary DNS server will be used if the Primary DNS server fails to connect.	None

Time Settings

The AWK-5232 has a time calibration function based on information from an NTP server or user specified Date and Time information. Functions such as Auto warning can add real-time information to the message.



Current local time shows the AWK-5232's system time when you open this web page. You can click on the **Set Time** button to activate the update after setting up the date and time parameters. An "(Updated)" string will appear to indicate that the change is complete. Local time settings will be immediately activated in the system without running Save and Restart.

NOTE The AWK-5232 has a real time clock (RTC). Users are strongly recommended to update the **Local time** for the AWK-5232 after initial setup or long-term shutdown, especially when the network does not have an Internet connection for accessing the NTP server or there is no NTP server on the LAN.

Current local time

Setting	Description	Factory Default
User adjustable time	The date and time parameters allow configuration of the local time with immediate activation.	None (yyyy/mm/dd hh:mm:ss format; 24-hour format.)

Time zone

Setting	Description	Factory Default
User selectable time zone	The time zone setting allows conversion from GMT (Greenwich Mean Time) to local time.	GMT (Greenwich Mean Time)

ATTENTION

Changing the time zone will automatically adjust the **Current local time**. You should configure the **Time zone** before setting the **Current local time**.

Daylight saving time

Setting	Description	Factory Default
Enable/ Disable	Daylight saving time (also know as DST or summer time) involves advancing clocks (usually 1 hour) during the summer time to provide an extra hour of daylight in the afternoon.	Disable

When **Daylight saving time** is enabled, the following parameters can be shown:

- The **Starts at** parameter allows users to enter the date that daylight saving time begins.
- The **Stops at** parameter allows users to enter the date that daylight saving time ends.
- The **Time offset parameter** indicates how many hours forward the clock should be advanced.

Time server 1 / 2

Setting	Description	Factory Default
The 1st/ 2nd time server IP/Name	IP or Domain address of NTP time server. The 2nd time will be used if the 1st NTP server fails to connect.	None

Query period

Setting	Description	Factory Default
Query period time (1- 9999 seconds)	This parameter determines how often the time is updated from the NTP server.	600 (seconds)

Wireless Settings

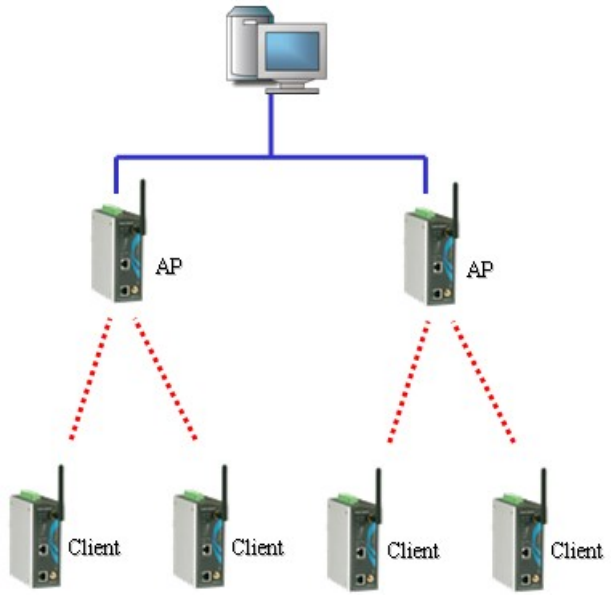
The essential settings for wireless networks are presented in this function group. Settings must be properly set before establishing your wireless network.

Operation Mode

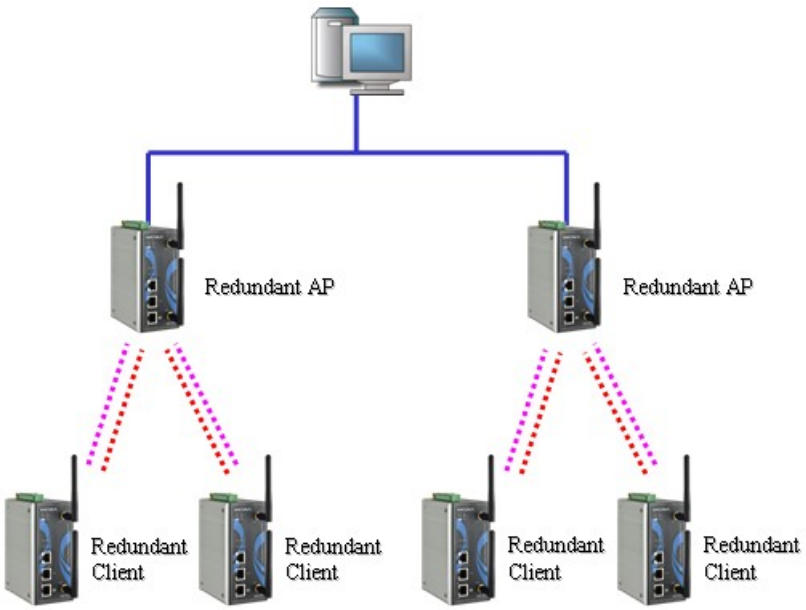
The AWK-5232 supports three operation modes that are used for different wireless network applications:

Wireless Redundancy

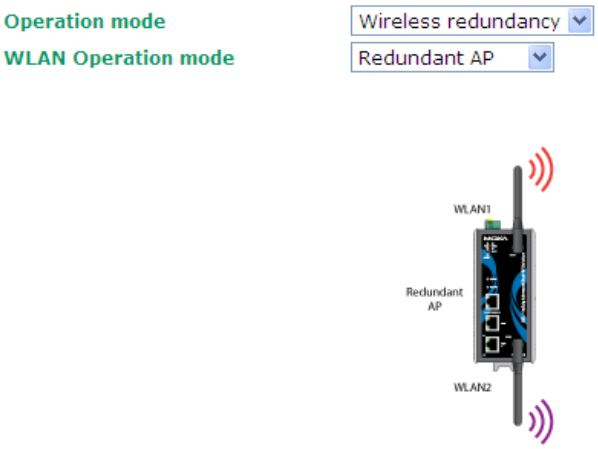
In traditional architectures, most vendors only provide a single RF AP and Client, in which the AP connects one or more Clients to the network. Since the AP and Client are connected by a single RF connection, if the RF connection is disconnected the system or network behind the Client will be disconnected, too.



With the new wireless redundancy technology, you can set up a redundant wireless connection between a **redundant client** device and a **redundant AP** device. The redundant structure involves using the AWK-5232's two RF modules to set up two independent wireless connections between the **redundant client** and **redundant AP** devices. If either of the two wireless connections fails, the other wireless connection will continue transmitting packets between the **redundant client** and **redundant AP** devices. In addition to carrying one or more redundant clients, standard single RF clients can also associate with the redundant AP. One of the biggest advantages of the AWK-5232's wireless redundancy mode is that you can expect "zero data loss."



The following figure shows the Wireless Redundancy operation mode:



WLAN Operation mode

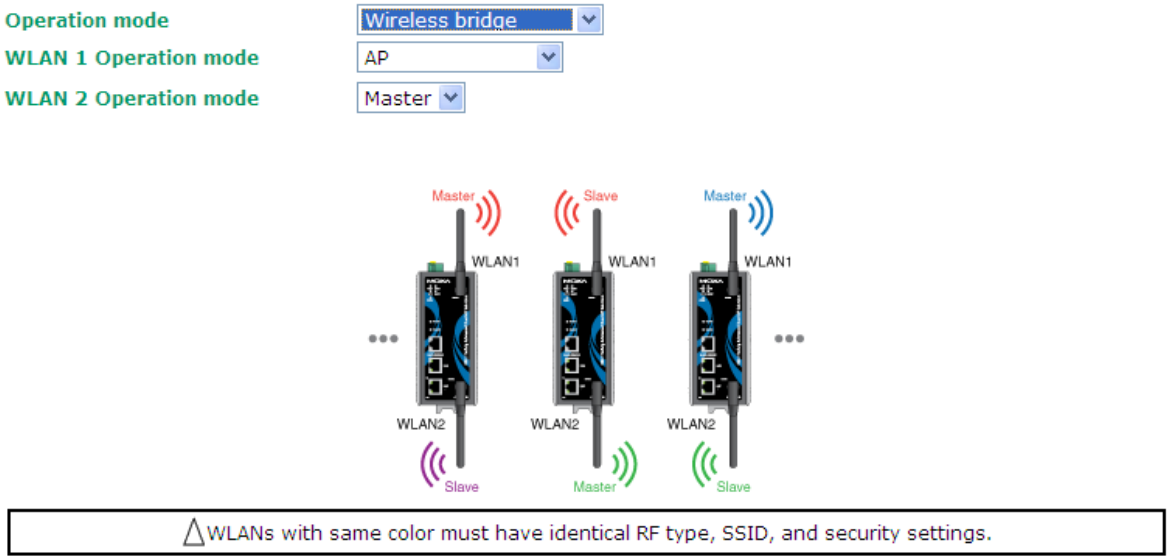
Setting	Description	Factory Default
Redundant AP	AP with Dual RF redundancy capable of serving dual RF clients.	Redundant AP
Redundant Client	Dual RF redundant clients can join dual RF redundant APs.	

Wireless Bridge

A bridge is a network component that connects two networks. AWK-5232's bridge operation is based on the AP (**master**) and Client (**Slave**) concept. Both sides of the connection must have the same RF type, SSID, and security settings.

For single RF mesh networks, the conventional setup is to use WDS to establish a static bridge link. In this case, the APs at both ends of the WDS link must be configured manually with each other's MAC addresses. The performance of a single RF bridge will be poor if more nodes are added.

The AWK-5232's dual RF bridge concept is different from using a single RF, because the AWK-5232 has dual RFs, and offer users a cascade link to bridge the two ends without narrowing down the throughput.

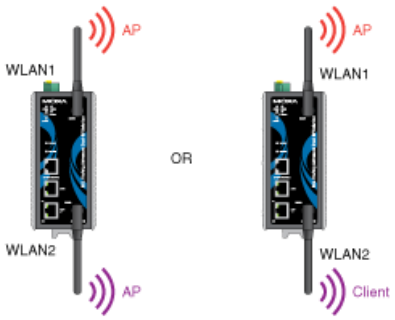


WLAN 1/WLAN 2 Operation mode

Setting	Description	Factory Default
Master	Master can build a connection with a Slave that has the same RF type, SSID, and security settings.	AP for WLAN 1 Master for WLAN 2
Slave	Slave can build a connection with a master that has the same RF type, SSID, and security settings.	

AP-Client

AP-Client mode provides a more flexible topology to allow the user to configure the 2 RF module for an AP or Client.



Matching Table for AP-Client's WLANs:

WLAN 1	WLAN 2	Allowable Setting
AP	AP	Allow
AP	Client	Allow
Client	Client	Not Allow
Client	AP	Allow

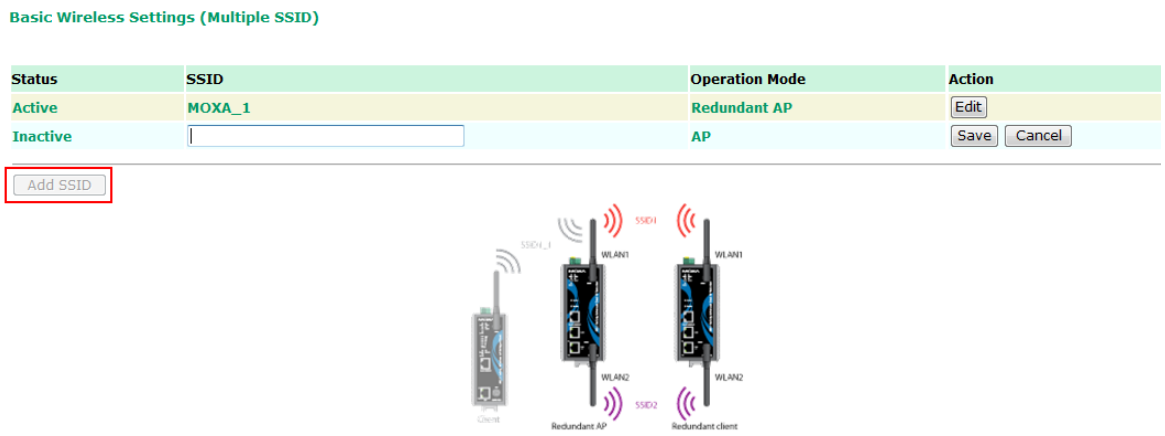
WLAN1 / WLAN2

Some applications already have existing Clients in the environment. The AWK-5232 not only can carry dual RF clients, but also single RF or existing Clients to the Ethernet LAN. This function is available in **Wireless Redundancy mode's Redundant AP**, or **Wireless Bridge mode's Master page**. Descriptions of other operation modes can be found in the "Basic Wireless Settings" section.

Enabling Non-Redundant (Single RF) AP

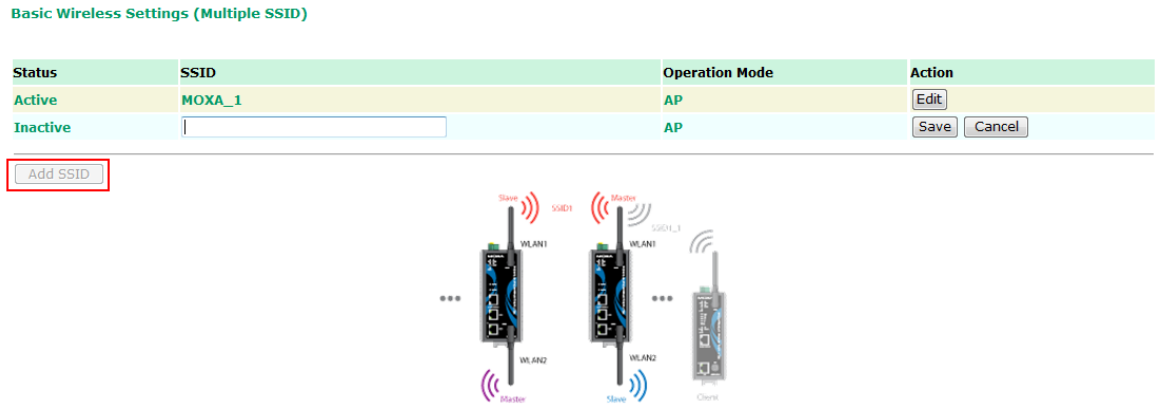
Wireless Redundancy mode's Redundant AP

The AWK-5232 can be configured as a single RF AP by entering "Add SSID"; the status will initially appear as inactive, but after entering the new SSID and hitting "Save", the status will change from inactive to active, showing that the WLAN is ready to operate as an access point in non-redundant AP mode (see figure on next page).



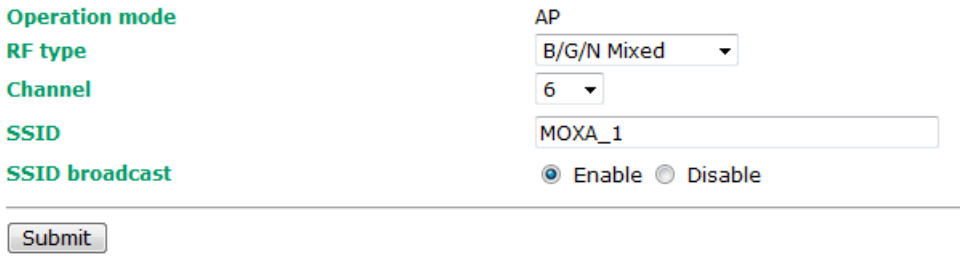
Wireless Bridge Mode's Master

You can set the virtual AP function in Wireless Bridge AP mode Master setting. Click Add SSID, enter the name for the SSID, then click Save.



Basic Wireless Setting

The following figure shows the Basic Wireless Settings page. The parameters and options are described as follows:



RF type

Setting	Description	Factory Default
2.4 GHz		
B	Only supports the IEEE 802.11b standard	B/G/N Mixed
G	Only supports the IEEE 802.11g standard	
B/G Mixed	Supports IEEE 802.11b/g standards, but 802.11g may operate at a slower speed if when 802.11b clients are on the network	

G/N Mixed	Supports IEEE 802.11g/n standards, but 802.11n may operate at a slower speed if 802.11g clients are on the network	
B/G/N Mixed	Supports IEEE 802.11b/g/n standards, but 802.11g/n may operate at a slower speed if 802.11b clients are on the network	
N Only (2.4GHz)	Only supports the 2.4 GHz IEEE 802.11n standard	
5 GHz		
A	Only supports the IEEE 802.11a standard	
A/N Mixed	Supports IEEE 802.11a/n standards, but 802.11n may operate at a slower speed if 802.11a clients are on the network	
N Only (5GHz)	Only supports the 5 GHz IEEE 802.11n standard	

Channel (for AP mode only)

Setting	Description	Factory Default
Available channels vary with RF type	The AWK-5232 plays the role of wireless AP.	6 (in B/G/N Mixed mode)

Channel Width (for any 11N RF type only)

Setting	Description	Factory Default
20 MHz	Select your channel width, If you are not sure which option to use, select 20/ 40MHz (Auto)	20 MHz
20/40 MHz		

Channel bonding

If 20/40 MHz is set, the channel bonding (40 MHz) will be automatically enabled if the connection target supports this feature.

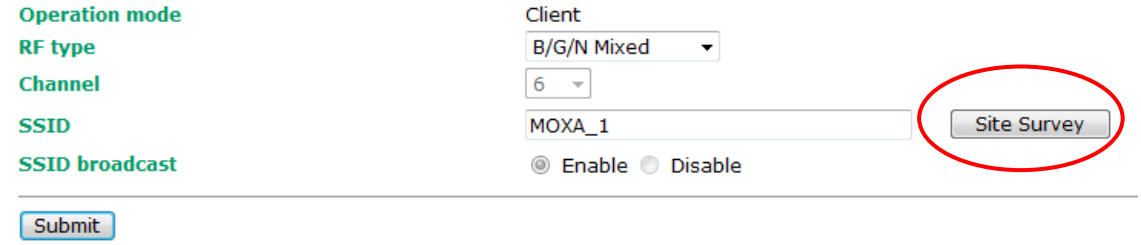
SSID

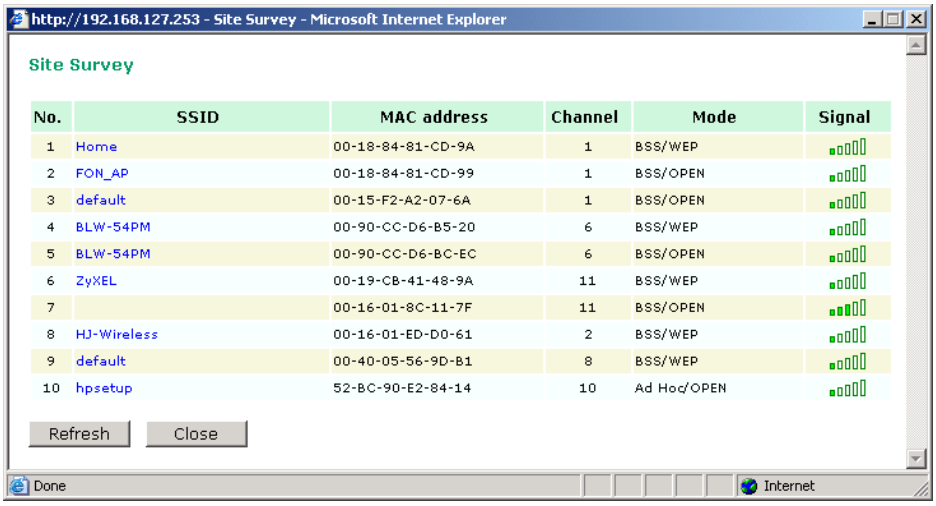
Setting	Description	Factory Default
Max. of 31 characters	The SSID of a client and the SSID of the AP must be identical for the client and AP to be able to communicate with each other.	MOXA_[RF number]

SSID broadcast (for AP mode only)

Setting	Description	Factory Default
Enable/ Disable	SSID can be broadcast or not	Enable

NOTE If your device uses **redundant Client, Client, or Slave** mode, you can find an additional **Site Survey** button on basic wireless settings page. The button supports site survey and pops up a dialog box listing the information for available APs, as shown in the following figure. You can click on the SSID of an entity and bring the value of its SSID onto the SSID field of the Basic Wireless Settings page. Clicking on the **Refresh** button will re-scan and update the table.

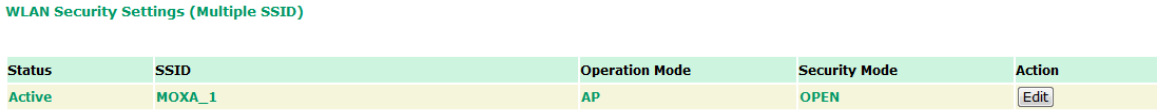



http://192.168.127.253 - Site Survey - Microsoft Internet Explorer
Site Survey
No. SSID MAC address Channel Mode Signal
1 Home 00-18-84-81-CD-9A 1 BSS/WEP
2 FON_AP 00-18-84-81-CD-99 1 BSS/OPEN
3 default 00-15-F2-A2-07-6A 1 BSS/OPEN
4 BLW-54PM 00-90-CC-D6-B5-20 6 BSS/WEP
5 BLW-54PM 00-90-CC-D6-BC-EC 6 BSS/OPEN
6 ZyXEL 00-19-CB-41-48-9A 11 BSS/WEP
7 00-16-01-8C-11-7F 11 BSS/OPEN
8 HJ-Wireless 00-16-01-ED-D0-61 2 BSS/WEP
9 default 00-40-05-56-9D-B1 8 BSS/WEP
10 hpsetup 52-BC-90-E2-84-14 10 Ad Hoc/OPEN
Refresh
Close
Done
Internet

WLAN Security Settings

The following figure shows the WLAN1/2 Security Settings page. The parameters and options are described as follows:

NOTE When you switch to **Wireless Redundancy mode**, you will see an additional **WLAN Security Setting** overview page. Please click on **Edit** to modify WLAN security settings.



The AWK-5232 provides four standardized wireless security modes: Open, WEP (Wired Equivalent Privacy), WPA (Wi-Fi Protected Access) and WPA2. Several types of security models are available in AWK-5232 by selecting ***Security mode*** and ***WPA type***:

- **Open:** No authentication, no data encryption.
- **WEP:** Static WEP (Wired Equivalent Privacy) keys must be manually configured.
- **WPA/WPA2-Personal:** also known as WPA/WPA2-PSK. You need to specify the Pre-Shared Key in the ***Passphrase*** field, which will be used by the TKIP or AES engine as a master key to generate keys that actually encrypt outgoing packets and decrypt incoming packets.
- **WPA/WPA2-Enterprise:** also called WPA/WPA2-EAP (Extensible Authentication Protocol). In addition to device-based authentication, WPA/WPA2-Enterprise enables user-based authentication via IEEE802.1X. The AWK-5232 can support three EAP methods: EAP-TLS, EAP-TTLS, and EAP-PEAP.

Security mode

Setting	Description	Factory Default
Open	No authentication	Open
WEP	Static WEP is used	
WPA	WPA is used	
WPA2	Fully supports IEEE 802.11i with “TKIP/AES + 802.1X” in 802.11a/b/g mode; supports IEEE 802.11i with "AES + 802.1X" in 802.11n mode	

Open

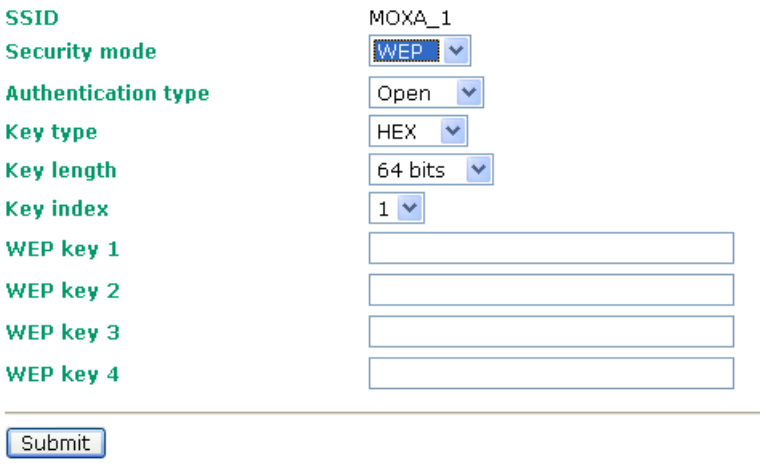
For security reasons, it is highly recommended that the security mode should be set to the options other than Open System. When the security mode is set to Open System, no authentication or data encryption will be performed.

WEP

According to the IEEE802.11 standard, WEP can be used for authentication and data encryption (confidentiality). **Shared** (or **Shared Key**) authentication type is used if WEP authentication and data encryption are both needed. Normally, **Open** (or **Open System**) authentication type is often used when WEP data encryption is run with authentication.

When WEP is enabled as a security mode, the length of a key (so-called WEP seed) can be specified as 64/128 bits, which is actually a 40/104-bit secret key with a 24-bit initialization vector. The AWK-5232 provides 4 entities of WEP key settings that can be selected to use with ***Key index***. The selected key setting specifies the key to be used as a *send-key* for encrypting traffic from the AP side to the wireless client side. All 4 WEP keys are used as *receive-keys* to decrypt traffic from the wireless client side to the AP side.

The WEP key can be presented in two ***Key type***, HEX and ASCII. Each ASCII character has 8 bits, so a 40-bit (or 64-bit) WEP key contains 5 characters, and a 104-bit (or 128-bit) key has 13 characters. In hex, each character uses 4 bits, so a 40-bit key has 10 hex characters, and a 128-bit key has 26 characters.



Authentication type

Setting	Description	Factory Default
Open	Data encryption is enabled, but no authentication.	Open
Shared	Data encryption and authentication are both enabled.	

Key type

Setting	Description	Factory Default
HEX	Specifies WEP keys in hex-decimal number form	HEX
ASCII	Specifies WEP keys in ASCII form	

Key length

Setting	Description	Factory Default
64 bits	Uses 40-bit secret keys with 24-bit initialization vector	64 bits
128 bits	Uses 104-bit secret key with 24-bit initialization vector	

Key index

Setting	Description	Factory Default
1-4	Specifies which WEP key is used	Open

WEP key 1-4

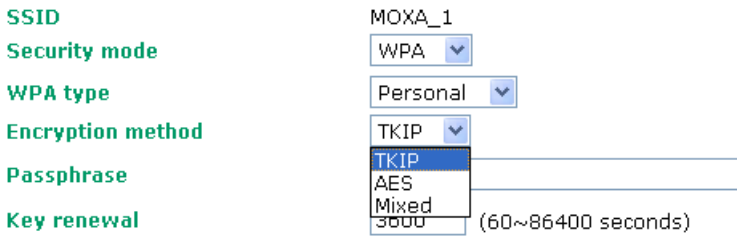
Setting	Description	Factory Default
ASCII type: 64 bits: 5 chars 128 bits: 13chars HEX type: 64 bits: 10 hex chars 128 bits: 26 hex chars	A string that can be used as a WEP seed for RC4 encryption engine.	None

WPA / WPA2-Personal

WPA (Wi-Fi Protected Access) and WPA2 are significantly improved encryption methods of WEP. WPA is a security standard based on 802.11i draft 3, while WPA2 is based on the fully ratified version of 802.11i. The initial vector is transmitted, encrypted, and enhanced with its 48 bits, twice as long as WEP. The key is regularly changed so that true session is secured.

Even though AES encryption is only included in the WPA2 standard, it is widely available in the WPA security mode of some wireless APs and clients as well. The AWK-5232 also supports AES algorithms in WPA and WPA2 for better compatibility.

Personal versions of WPA/WPA2, also know as WPA/WPA-PSK (*Pre-Shared Key*), provides a simple way of encrypting a wireless connection for high confidentiality. A ***Passphrase*** is used as a basis for encryption methods (or cipher types) in a WLAN connection. The passphrases should be complex and as long as possible. The number of ASCII characters of the Passphrase must be at least 8 and can go up to 63. For security reason, this passphrase should be disclosed to the relevant users only and changed regularly.



WPA Type

Setting	Description	Factory Default
Personal	Provides Pre-Shared Key-enabled WPA and WPA2	Personal
Enterprise	Provides enterprise-level security for WPA and WPA2	

Encryption method

Setting	Description	Factory Default
TKIP	Temporal Key Integrity Protocol is enabled Note: This option is not supported under 802.11n.	TKIP
AES	Advance Encryption System is enabled	
Mixed	Provides TKIP broadcast key and TKIP+AES unicast key for some legacy AP clients. This option is rarely used. Note: This option is available in Redundant AP, AP, or Master mode only, and cannot support AES-enabled clients.	

Passphrase

Setting	Description	Factory Default
8 – 63 characters	Master key to generate keys for encryption and decryption	None

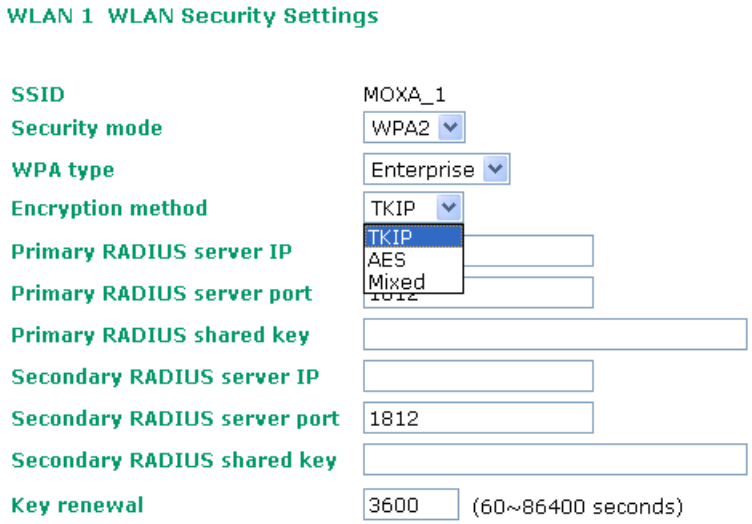
Key renewal (for Redundant AP, AP, or Master mode only)

Setting	Description	Factory Default
60 – 86400 seconds (1 minute to 1 year)	Specifies the time period of group key renewal	3600 (seconds)

NOTE The value for ***key renewal*** instructs the wireless AP how often it should change the encryption keys. Usually the security level will be higher if you set this value shorter so that the encryption keys are changed more often. Default value is 3600 seconds (6 minutes). Longer time periods can be considered if traffic is not so busy.

WPA / WPA2-Enterprise (for Redundant AP, AP, or Master mode)

By selecting ***WPA type*** as **Enterprise**, you can use **EAP** (*Extensible Authentication Protocol*), a framework authentication protocol used by 802.1X to provide network authentication. In these Enterprise-level security modes, a back-end RADIUS (Remote Authentication Dial-In User Service) server is needed if IEEE 802.1X functionality is enabled in WPA /WPA2. The IEEE 802.1X protocol also offers the possibility of carrying out an efficient connection authentication in a large-scaled network. It is not necessary to exchange keys or pass phrases.



WPA Type

Setting	Description	Factory Default
Personal	Provides Pre-Shared Key-enabled WPA and WPA2	Personal
Enterprise	Provides enterprise-level security for WPA and WPA2	

Encryption method

Setting	Description	Factory Default
TKIP	Temporal Key Integrity Protocol is enabled Note: This option is not supported under 802.11n.	TKIP
AES	Advance Encryption System is enabled	
Mixed	Provides TKIP broadcast key and TKIP+AES unicast key for some legacy AP clients. This option is rarely used. Note: This option is available in Redundant AP, AP, or Master mode only, and cannot support AES-enabled clients.	

Primary/ Secondary RADIUS server IP

Setting	Description	Factory Default
The IP address of RADIUS server	Specifies the delegated RADIUS server for EAP	None

Primary/ Secondary RADIUS port

Setting	Description	Factory Default
Port number	Specifies the port number of the delegated RADIUS server	1812

Primary/ Secondary RADIUS shared key

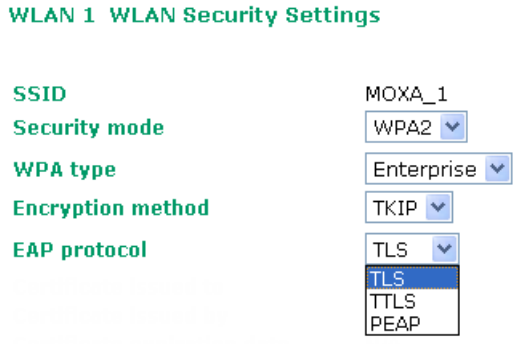
Setting	Description	Factory Default
Max. 31 characters	The secret key shared between AP and RADIUS server	None

Key renewal

Setting	Description	Factory Default
60 – 86400 seconds (1 minute to 1 year)	Specifies the time period of group key renewal	3600 (seconds)

WPA/WPA2-Enterprise (for Redundant Client, Client, or Slave mode)

In a client role, the AWK-5232 can support three EAP methods (or ***EAP protocol***s): **EAP-TLS**, **EAP-TTLS**, and **EAP-PEAP**, corresponding to WPA/WPA-Enterprise settings on the AP side.



Encryption method

Setting	Description	Factory Default
TKIP	Temporal Key Integrity Protocol is enabled Note: This option is not supported under 802.11n.	TKIP
AES	Advance Encryption System is enabled	

EAP Protocol

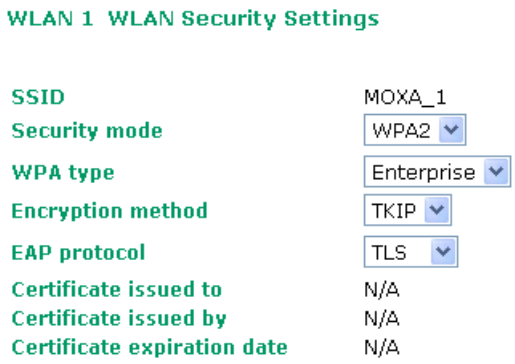
Setting	Description	Factory Default
TLS	Specifies **T**ransport **L**ayer **S**ecurity protocol	TLS
TTLS	Specifies **T**unneled **T**ransport **L**ayer **S**ecurity	
PEAP	Specifies **P**rotected **E**xtensible **A**uthentication **P**rotocol, or *Protected EAP*	

Before choosing the EAP protocol for your WPA/WPA2-Enterpise settings on the client end, please contact the network administrator to make sure the system supports the protocol on the AP end. Detailed information on these three popular EAP protocols is presented in the following sections:

EAP-TLS

TLS is the standards-based successor to the Secure Socket Layer (SSL). It can establish a trusted communication channel over a distrusted network. TLS provides mutual authentication through certificate exchange. EAP-TLS is also secure to use. You are required to submit a digital certificate to the authentication server for validation, but the authentication server must also supply a certificate.

You can use **WLAN 1/2 → WLAN Certificate Settings** to import your WLAN certificate and enable EAP-TLS on the client end.



You can check the current certificate status in ***Current Status*** if it is available.

Certificate issued to: shows the certificate user.
Certificate issued by: shows the certificate issuer.
Certificate expiration date: indicates when the certificate gets invalid.

EAP-TTLS

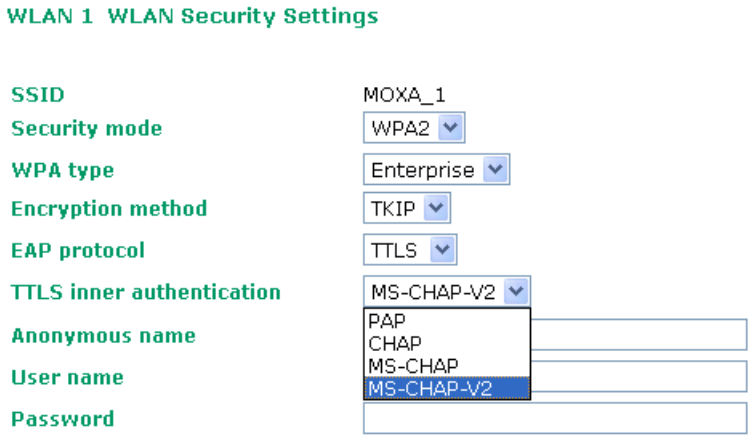
It is usually much easier to re-use existing authentication systems, such as a Windows domain or Active Directory, LDAP directory, or Kerberos realm, rather than creating a parallel authentication system. As a result, TTLS (Tunneled TLS) and PEAP (Protected EAP) are used to support the use of so-called “legacy authentication methods.”

TTLS and PEAP work in a similar way. First, they establish a TLS tunnel, like EAP-TLS, and validate whether the network is trustworthy with digital certificates on the authentication server. This step is run to establish a tunnel that protects the next step (or “inner” authentication) so it is sometimes referred to as the “outer” authentication. Then the TLS tunnel is used to encrypt an older authentication protocol that authenticates the user for the network.

As you can see, digital certificates are still needed for the outer authentication in a simplified form. Only a small number of certificates are required, which can be generated by a small certificate authority. Certificate reduction makes TTLS and PEAP much more popular than EAP-TLS.

The AWK-5232 provides some non-cryptographic EAP methods including **PAP**, **CHAP**, **MS-CHAP**, and **MS-CHAP-V2**. These EAP methods are not recommended for direct use on wireless networks. However, they may be useful as inner authentication methods with TTLS or PEAP.

Because the inner and outer authentications can use distinct user names in TTLS and PEAP, you can use an anonymous user name for the outer authentication, while the true user name is shown only through the encrypted channel. Remember, not all client software supports anonymous altercation. Confirm this with the network administrator before you enable identity hiding in TTLS and PEAP.



TTL Inner Authentication

Setting	Description	Factory Default
PAP	**P**assword **A**uthentication **P**rotocol is used	MS-CHAP-V2
CHAP	**C**hallenge **H**andshake **A**uthentication **P**rotocol is used	
MS-CHAP	Microsoft CHAP is used	
MS-CHAP-V2	Microsoft CHAP version 2 is used	

Anonymous

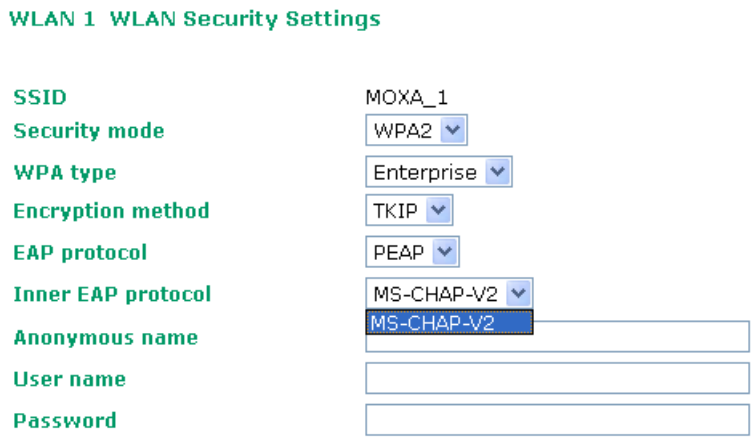
Setting	Description	Factory Default
Max. 31 characters	A distinct name used for outer authentication	None

User name & Password

Setting	Description	Factory Default
	User name and password used in inner authentication	None

PEAP

There are a few differences in the inner authentication procedures for TTLS and PEAP. TTLS uses the encrypted channel to exchange attribute-value pairs (AVPs), while PEAP uses the encrypted channel to start a second EAP exchange inside of the tunnel. The AWK-5232 provides **MS-CHAP-V2** merely as an EAP method for inner authentication.



Inner EAP protocol

Setting	Description	Factory Default
MS-CHAP-V2	Microsoft CHAP version 2 is used	MS-CHAP-V2

Anonymous

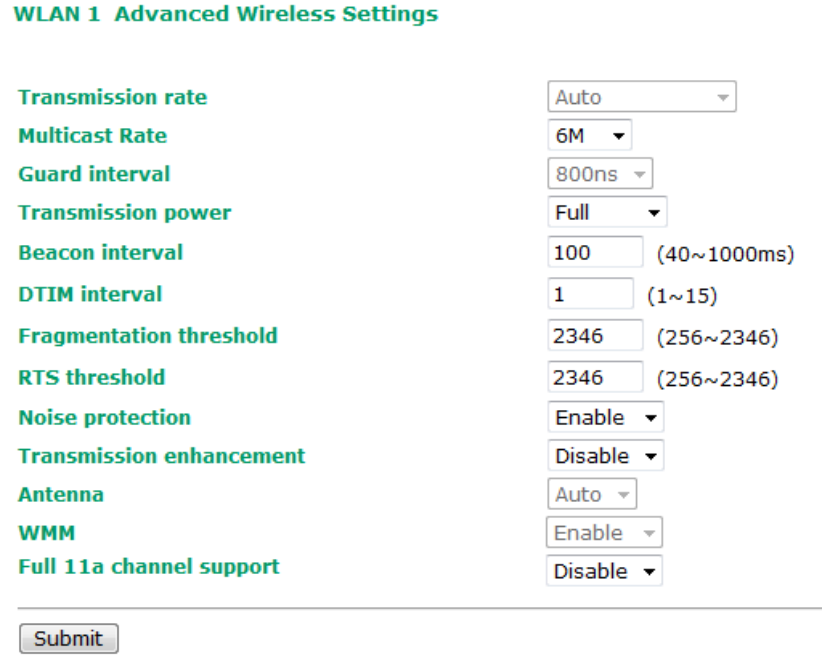
Setting	Description	Factory Default
Max. 31 characters	A distinct name used for outer authentication	None

User name & Password

Setting	Description	Factory Default
	User name and password used in inner authentication	None

Advanced Wireless Settings

Additional wireless-related parameters are presented in this section to help you set up your wireless network in detail.



Transmission Rate

Setting	Description	Factory Default
Auto	The AWK-5232 senses and adjusts the data rate automatically	Auto
Available rates	Users can manually select a target transmission data rate	

Multicast Rate

Setting	Description	Factory Default
Available rates	You can set a fixed multicast rate for the transmission of broadcast and multicast packets on a per-radio basis. This parameter can be useful in an environment where multicast video streaming is occurring in the wireless medium, providing the wireless clients are capable of handling the configured rate.	6M

Guarding Interval

Setting	Description	Factory Default
Guarding Interval	Guarding interval is used to ensure that distinct transmissions do not interfere with one another. You can select the guarding interval manually for Wireless-N connections. The two options are Short (400ns) and Long (800ns).	800ns.

RF type = 2.4 GHz

Setting	Description	Factory Default
Auto	Specifies wireless signal coverage by automatically selecting the strength of Tx power	Full
Full	Equivalent to maximum Tx power	
High	-4 dB of full Tx power	
Medium	-8 dB of full Tx power	
Low	-12 dB of full Tx power	

NOTE **Each antenna port's Tx power at "Full"**

- US model: 18 dBm
- EU model: 16 dBm
- JP model: 18 dBm

RF type = 5 GHz

Setting	Description	Factory Default
Auto	Specifies wireless signal coverage by automatically selecting the strength of Tx power	Full
Full	Equivalent to full Tx power	
High	-4 dB at full Tx power	
Medium	-8 dB at full Tx power	
Low	-12 dB at full Tx power	

NOTE **Each antenna port's Tx power at "Full"**

- US model: 14 dBm
- EU model: 16 dBm
- JP model: 14 dBm

Beacon Interval (for AP/Master mode only)

Setting	Description	Factory Default
Beacon Interval (40 to 1000 ms)	Indicates the frequency interval of the beacon	100 (ms)

DTIM Interval (for AP/Master mode only)

Setting	Description	Factory Default
Data Beacon Rate (1 to 15)	Indicates how often the AWK-5232 sends out a Delivery Traffic Indication Message	1

Fragmentation threshold

Setting	Description	Factory Default
Fragment Length (256 to 2346)	Specifies the maximum size a data packet before splitting and creating another new packet	2346

RTS threshold

Setting	Description	Factory Default
RTS/CTS Threshold (256 to 2346)	Determines how large a packet can be before the Access Point coordinates transmission and reception to ensure efficient communication	2346

NOTE You can refer to the related glossaries in Chapter 5 for detailed information about the above-mentioned settings. By setting these parameters properly, you can better tune the performance of your wireless network.

Noise protection

Setting	Description	Factory Default
Enable/Disable	Adjusts the interference coping capability of the wireless signal. This option should be enabled for communication distance under 500 meters, and should be disabled for communication distances over 500 meters.	Enable

Transmission enhancement

Setting	Description	Factory Default
Enable/Disable	This setting can enhance communication by strengthening the AWK-5232's transmission power. It is quite useful for long-distance transmission or countering environmental interference. The user must carefully evaluate and measure the transmission power of the entire system to ensure it stays below the regulative limit. In addition, that RF type 802.11a mode cannot be used if this function is enabled.	Disable

NOTE Make sure the same **Transmission distance** parameters are set in both **AP** and **Client**. When this parameter is greater than 500, an optimal algorithm will be enabled to support long-distance transmission.
Note that **Transmission enhancement** only supports **802.11b/g/n** mode; **802.11a** mode is not supported.
Transmission enhancement is also recommended to enable communication at both ends when long-distance transmission is required. A high-gain antenna installed at a fixed antenna connector can also improve performance.

EAPOL Version

Setting	Description	Factory Default
1	EAPOL version 1 was standardized in the 2001 version of 802.1X, which is much more commonly implemented.	1
2	EAPOL version 2 was specified in 802.1X-2004.	

WMM

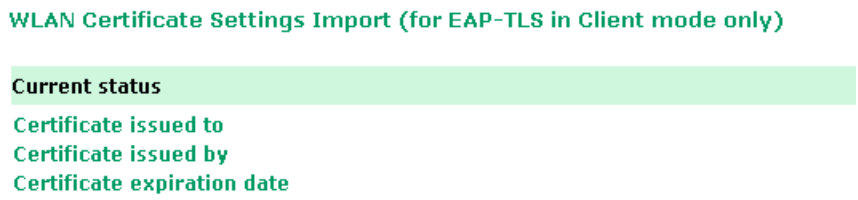
Setting	Description	Factory Default
Enable/Disable	WMM is a QoS standard for WLAN traffic. Voice and video data will be given priority bandwidth when enabled with WMM supported wireless clients. Note: WMM will always be enabled under 802.11n mode.	Enable

Full 11a channel support

Setting	Description	Factory Default
Enable/Disable	Enabling this option allows users to select 5GHz channels from both licensed and unlicensed bands.	Disable

WLAN Certification Settings (for EAP-TLS in Redundant Client, Client or Slave mode only)

When EAP-TLS is used, a WLAN Certificate will be required at the client end to support WPA/WPA2-Enterprise. The AWK-5232 can support the **PKCS #12**, also known as *Personal Information Exchange Syntax Standard*, certificate formats that define file formats commonly used to store private keys with accompanying public key certificates, protected with a password-based symmetric key.

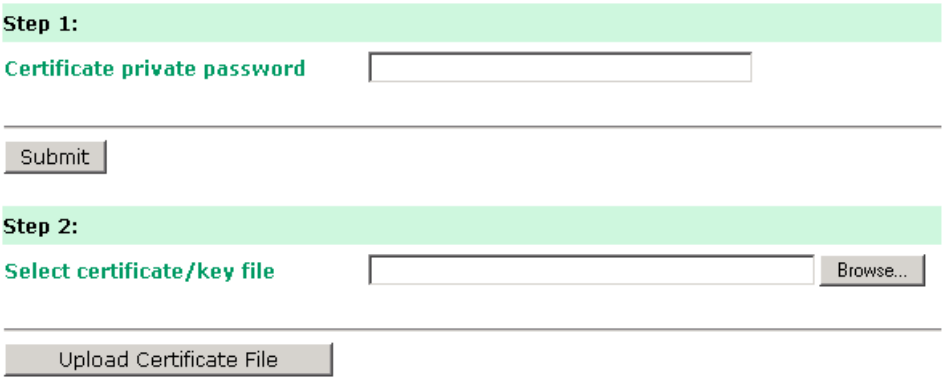

WLAN Certificate Settings Import (for EAP-TLS in Client mode only)
Current status
Certificate issued to
Certificate issued by
Certificate expiration date

Current Status displays information for the current WLAN certificate, which has been imported into the AWK-5232. Nothing will be shown if no certificate is available.

Certificate issued to: shows the certificate user
Certificate issued by: shows the certificate issuer
Certificate expiration date: indicates when the certificate gets invalid

You can import a new WLAN certificate in ***Import WLAN Certificate*** by following these steps in order:

1. Input the corresponding password (or key) in the **Certificate private password** field. Then click **Submit** to set the password.
2. You can see the password displayed in the **Certificate private password** field. Then click on the **Browse** button in ***Select certificate / key file*** and select the certificate file.
3. Click **Upload Certificate File** to import the certificate file. If it succeeds, you can see the information uploaded in ***Current Certificate***. If it fails, you may need to return to step 1 to set the password correctly and then import the certificate file again.



NOTE The WLAN certificate will remain after the AWK-5232 reboots. Even though it is expired, it can still be seen on ***Current Certificate***.

Advanced Settings

Several advanced functions are available to increase the functionality of your AWK-5232 and wireless network system. The DHCP server helps you deploy wireless clients efficiently. Packet filters provide security mechanisms, such as firewalls, in different network layers. Moreover, the AWK-5232 can support STP/RSTP protocol to increase the reliability across the entire network. In addition, SNMP support can ease the network management via SNMP protocols.

Using Virtual LAN

Setting up Virtual LANs (VLANs) on your AWK series increases the efficiency of your network by dividing the LAN into logical segments, as opposed to physical segments. In general, VLANs are easier to manage.

The Virtual LAN (VLAN) Concept

What is a VLAN?

A virtual LAN, commonly known as a VLAN, is a group of hosts with a common set of requirements that communicate as if they were attached to the same broadcast domain, regardless of their physical location. A VLAN has the same attributes as a physical LAN, but it allows for end stations to be grouped together even if they are not located on the same network switch. Network reconfiguration can be done through software instead of physically relocating devices.

VLANs now extend as far as the reach of the access point signal. Clients can be segmented into wireless sub-networks via SSID and VLAN assignment. A Client can access the network by connecting to an AP configured to support its assigned SSID/VLAN.

Benefits of VLANs

VLANs are used to conveniently, efficiently, and easily manage your network in the following ways:

- Manage adds, moves, and changes from a single point of contact
- Define and monitor groups
- Reduce broadcast and multicast traffic to unnecessary destinations
- Improve network performance and reduce latency
- Increase security
- Secure network restricts members to resources on their own VLAN
- Clients roam without compromising security

VLAN Workgroups and Traffic Management

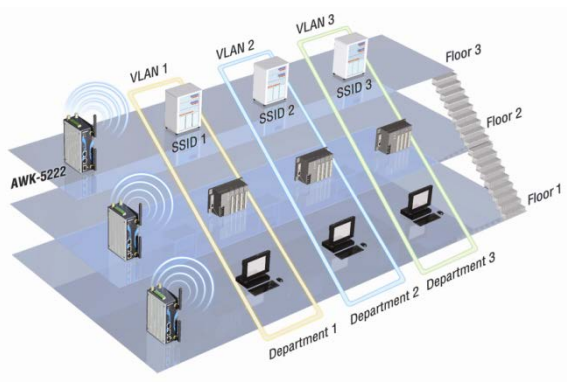
The AP assigns clients to a VLAN based on a Network Name (SSID). The AP can support up to 9 SSIDs per radio interface, with a unique VLAN configurable per SSID.

The AP matches packets transmitted or received to a network name with the associated VLAN. Traffic received by a VLAN is only sent on the wireless interface associated with that same VLAN. This eliminates unnecessary traffic on the wireless LAN, conserving bandwidth and maximizing throughput.

In addition to enhancing wireless traffic management, the VLAN-capable AP supports easy assignment of wireless users to workgroups. In a typical scenario, each user VLAN represents a department workgroup; for example, one VLAN could be used for a marketing department and the other for a human resource department.

In this scenario, the AP would assign every packet it accepted to a VLAN. Each packet would then be identified as marketing or human resource, depending on which wireless client received it. The AP would insert VLAN headers or “tags” with identifiers into the packets transmitted on the wired backbone to a network switch.

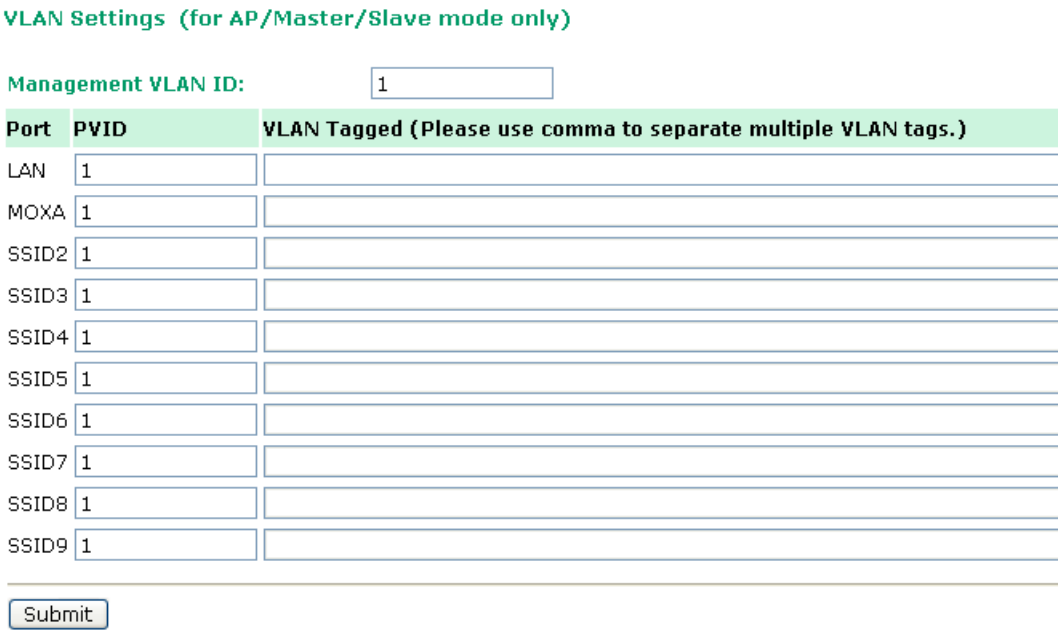
Finally, the switch would be configured to route packets from the marketing department to the appropriate corporate resources such as printers and servers. Packets from the human resource department could be restricted to a gateway that allowed access to only the Internet. A member of the human resource department could send and receive e-mail and access the Internet, but would be prevented from accessing servers or hosts on the local corporate network.



Configuring Virtual LAN

VLAN Settings

To configure the AWK's VLAN, use the VLAN Setting page to configure the ports.



Management VLAN ID

Setting	Description	Factory Default
VLAN ID ranges from 1 to 4094	Set the management VLAN of this AWK.	1

Port

Type	Description	Trunk Port
LAN	This port is the LAN port on the AWK.	Yes
WLAN	This is a wireless port for the specific SSID. This field will refer to the SSID that you have created. If more SSIDs have been created, new rows will be added.	

Port PVID

Setting	Description	Factory Default
VLAN ID ranging from 1 to 4094	Set the port's VLAN ID for devices that connect to the port. The port can be a LAN port or WLAN ports.	1

VLAN Tagged

Setting	Description	Factory Default
A comma-seperated list of VLAN IDs. Each of the VLAN IDs range from 1 to 4094.	Specify which VLANs can communicate with this specific VLAN.	(Empty)

NOTE The VLAN feature can allow wireless clients to manage the AP. If the VLAN Management ID matches a VLAN ID, then those wireless clients who are members of that VLAN will have AP management access.

CAUTION: Once a VLAN Management ID is configured and is equivalent to one of the VLAN IDs on the AP, all members of that User VLAN will have management access to the AP. Be careful to restrict VLAN membership to those with legitimate access to the AP.

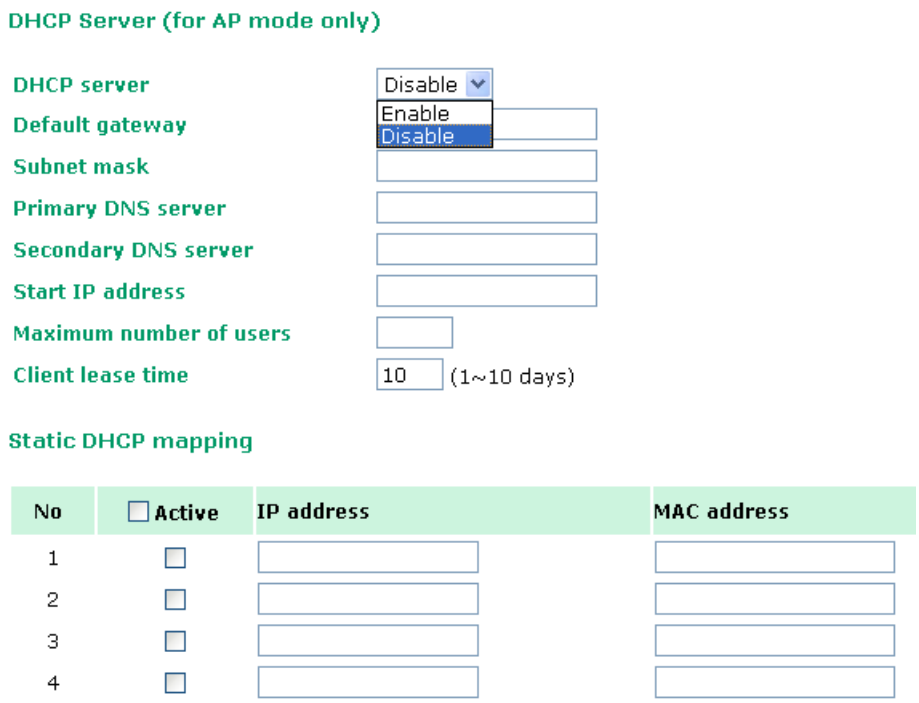
DHCP Server (for AP-Client operation mode's AP mode only)

DHCP (Dynamic Host Configuration Protocol) is a networking protocol that allows administrators to assign temporary IP addresses to network computers by "leasing" an IP address to a user for a limited amount of time, instead of assigning permanent IP addresses.

The AWK-5232 can act as a simplified DHCP server and easily assign IP addresses to your wireless clients by responding to the DHCP requests from the client ends. The IP-related parameters you set on this page will also be sent to the client.

You can also assign a static IP address to a specific client by entering its MAC address. The AWK-5232 provides a **Static DHCP mapping** list with up to 16 entities. Be reminded to check the **Active** check box for each entity to activate the setting.

You can check the IP assignment status under **Status → DHCP Client List**.



DHCP server (AP only)

Setting	Description	Factory Default
Enable	Enables AWK-5232 as a DHCP server	Disable
Disable	Disable DHCP server function	

Default gateway

Setting	Description	Factory Default
IP address of a default gateway	The IP address of the router that connects to an outside network	None

Subnet mask

Setting	Description	Factory Default
subnet mask	Identifies the type of sub-network (e.g., 255.255.0.0 for a	None

	Class B network, or 255.255.255.0 for a Class C network)	

Primary/ Secondary DNS server

Setting	Description	Factory Default
IP address of Primary/ Secondary DNS server	The IP address of the DNS Server used by your network. After entering the DNS Server's IP address, you can use URL as well. The Secondary DNS server will be used if the Primary DNS server fails to connect.	None

Start IP address

Setting	Description	Factory Default
IP address	Indicates the IP address which AWK-5232 can start assigning.	None

Maximum number of users

Setting	Description	Factory Default
1 – 999	Specifies how many IP address can be assigned continuously	None

Client lease time

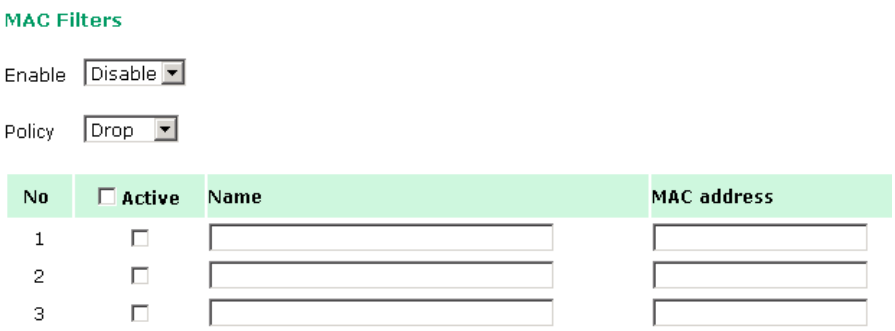
Setting	Description	Factory Default
1 – 10 days	The lease time for which an IP address is assigned. The IP address may go expired after the lease time is reached.	10 (days)

Packet Filters

The AWK-5232 includes various filters for **IP-based** packets going through LAN and WLAN interfaces. You can set these filters as a firewall to help enhance network security.

MAC Filter

The AWK-5232's MAC filter is a policy-based filter that can allow or filter out IP-based packets with specified MAC addresses. The AWK-5232 provides 8 entities for setting MAC addresses in your filtering policy. Remember to check the **Active** check box for each entity to activate the setting.



Enable

Setting	Description	Factory Default
Enable	Enables MAC filter	Disable
Disable	Disables MAC filter	

Policy

Setting	Description	Factory Default
Accept	Only the packets fitting the entities on list can be allowed.	Drop
Drop	Any packet fitting the entities on list will be denied.	

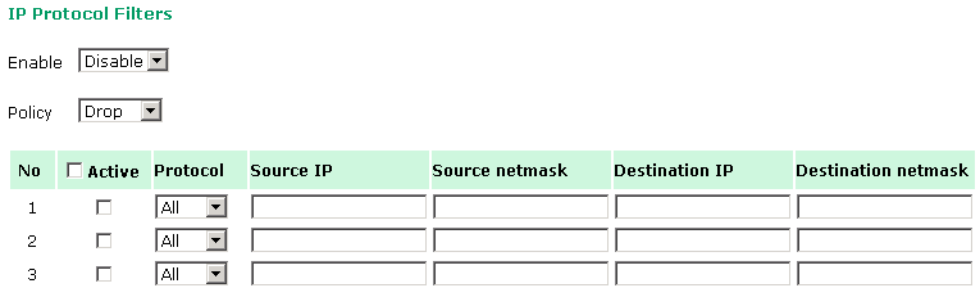
ATTENTION

Be careful when you enable the filter function:
Drop + "no entity on list is activated" = all packets are **allowed**
Accept + "no entity on list is activated" = all packets are **denied**

IP Protocol Filter

The AWK-5232's IP protocol filter is a policy-based filter that can allow or filter out IP-based packets with specified IP protocol and source/destination IP addresses.

The AWK-5232 provides 8 entities for setting IP protocol and source/destination IP addresses in your filtering policy. Four IP protocols are available: **All**, **ICMP**, **TCP**, and **UDP**. You must specify either the Source IP or the Destination IP. By combining IP addresses and netmasks, you can specify a single IP address or a range of IP addresses to accept or drop. For example, "IP address 192.168.1.1 and netmask 255.255.255.255" refers to the sole IP address 192.168.1.1. "IP address 192.168.1.1 and netmask 255.255.255.0" refers to the range of IP addresses from 192.168.1.1 to 192.168.255. Remember to check the **Active** check box for each entity to activate the setting.



Enable

Setting	Description	Factory Default
Enable	Enables IP protocol filter	Disable
Disable	Disables IP protocol filter	

Policy

Setting	Description	Factory Default
Accept	Only the packets fitting the entities on the list can be allowed	Drop
Drop	Any packet fitting the entities on the list will be denied	

ATTENTION

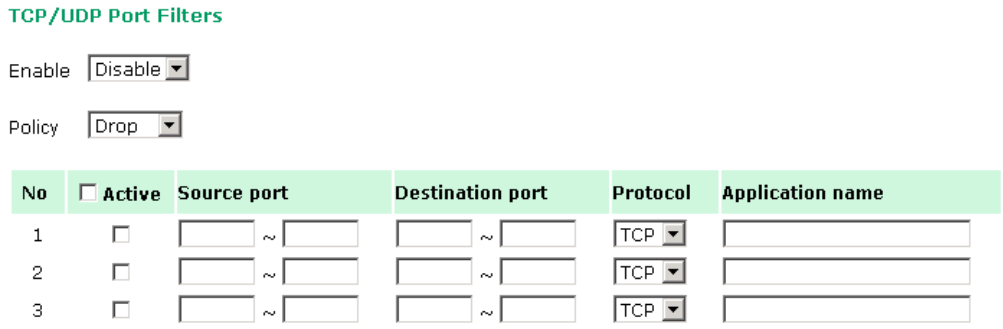
Be careful when you enable the filter function:
Drop + "no entity on list is activated" = all packets are **allowed**.
Accept + "no entity on list is activated" = all packets are **denied**.

TCP/UDP Port Filter

The AWK-5232's TCP/UDP port filter is a policy-based filter that can allow or filter out TCP/UDP-based packets with a specified source or destination port.

The AWK-5232 provides 8 entities for setting the range of source/destination ports of a specific protocol. In addition to selecting TCP or UDP protocol, you can set either the source port, destination port, or both. The end port can be left empty if only a single port is specified. Of course, the end port cannot be larger then the start port.

The **Application name** is a text string that describes the corresponding entity with up to 31 characters. Remember to check the **Active** check box for each entity to activate the setting.



Enable

Setting	Description	Factory Default
Enable	Enables TCP/UDP port filter	Disable
Disable	Disables TCP/UDP port filter	

Policy

Setting	Description	Factory Default
Accept	Only the packets fitting the entities on list can be allowed.	Drop
Drop	Any packet fitting the entities on list will be denied.	

ATTENTION

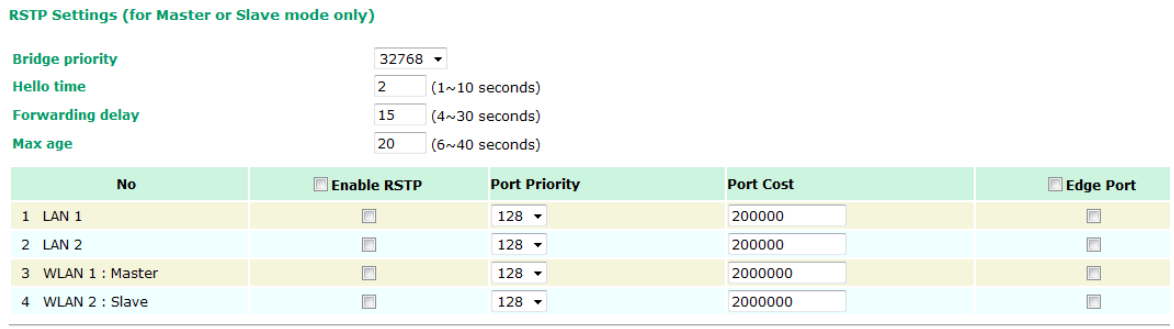
Be careful when you enable the filter function:
Drop + "no entity on list is activated" = all packets are **allowed**
Accept + "no entity on list is activated" = all packets are **denied**

RSTP Settings (for Master or Slave mode only)

AWK-5232 supports IEEE802.1D Spanning Tree Protocol and IEEE802.1w Rapid STP standards. In addition to eliminating unexpected path looping, STP/RSTP can provide a backup path recovery if a wired/ wireless path fails accidentally. The reliability and availability can increase because this fail-over function.

AWK-5232's STP/RSTP feature is disabled by default. To be completely effective, you must enable RSTP/STP on every AWK-5232 connected to your network.

The following figures indicate which Spanning Tree Protocol parameters can be configured. A more detailed explanation of each parameter is given below the figure.



RSTP status

This field will appear only when selected to operate STP/RSTP. It indicates whether this AWK-5232 is the Root of the Spanning Tree (the root is determined automatically) or not.

Bridge priority

Setting	Description	Factory Default
Numerical value selected by user	You can increase the bridge priority by selecting a lower number. A higher bridge priority brings a greater chance of being established as the root of the Spanning Tree topology.	32768

Hello time

Setting	Description	Factory Default
Numerical value input by user (1 – 10 seconds)	The root of the Spanning Tree topology periodically sends out a "hello" message to other devices on the network to check if the topology is healthy. ***Hello time*** indicates how often the root sends hello messages.	2 (seconds)

Forwarding delay

Setting	Description	Factory Default
Numerical value input by user (4 – 30 seconds)	The amount of time this device waits before checking to see if it should change to a different topology.	15 (seconds)

Max. age

Setting	Description	Factory Default
Numerical value input by user (6 – 40 seconds)	As a non-root role, if the device has not received a hello message from the root longer than ***Max. age***, it will reconfigure itself as a root. Once two or more devices on the network are recognized as a root, the devices will renegotiate to set up a new Spanning Tree topology.	20 (seconds)

Enable RSTP

Setting	Description	Factory Default
Enable/ disable	Enables or disables the port as a node on the Spanning Tree topology.	Disable (unchecked)

Port priority

Setting	Description	Factory Default
Numerical value selected by user	Increase this port's priority as a node on the Spanning Tree topology by inputting a lower number.	128

Port cost

Setting	Description	Factory Default
Enable/ Disable	Input a higher cost to indicate that this port is less suitable as a node for the Spanning Tree topology	20000

Edge port

Setting	Description	Factory Default
Checked/ unchecked	Sets a port, which no BPDU expectedly goes through, as an edge port	unchecked, except ***WLAN1 / 2*** ports

NOTE We recommend you set an edge port for the port, which is connected to a non-STP/RSTP sub-network or an end device (PLC, RTU, etc.) as opposed to network equipment. This can prevent unnecessary waiting and negotiation of STP/RSTP protocol, and accelerate system initialization. When an edge port receives BPDUs, it can still function as an STP/RSTP port and start negotiation.
Setting an edge port is different from disabling STP/RSTP on a port. If you disable STP/RSTP, a port will not deal with STP/RSTP BPDUs at all.

Port Status

Port Status indicates the current Spanning Tree status of this port. Use **Forwarding** for normal transmission, or **Blocking** to block transmission.

SNMP Agent

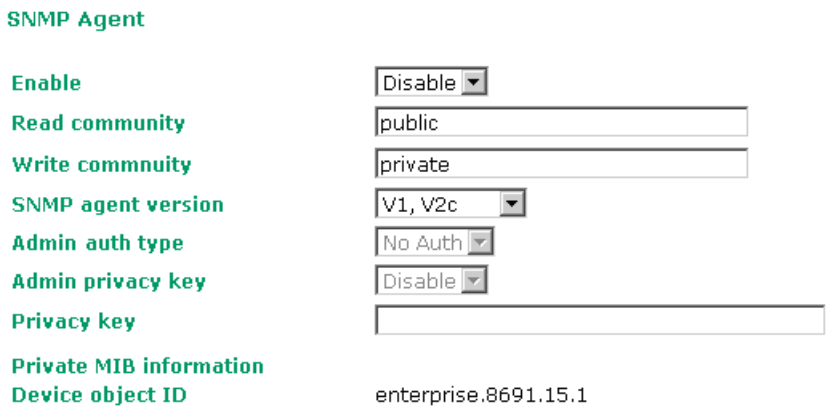
The AWK-5232 supports SNMP V1/V2c/V3. SNMP V1 and SNMP V2c use a community string match for authentication, which means that SNMP servers access all objects with read-only or read/write permissions using the community string *public*/*private* (default value). SNMP V3, which requires you to select an authentication level of MD5 or SHA, is the most secure protocol. You can also enable data encryption to enhance data security.

The AWK-5232's MIB can be found in the software CD and supports reading the attributes via SNMP. (Only ***get*** method is supported.)

SNMP security modes and security levels supported by the AWK-5232 are shown in the following table. Select the security mode and level that will be used to communicate between the SNMP agent and manager.

Protocol Version	Setting on UI web page	Authentication Type	Data Encryption	Method
SNMP V1, V2c	V1, V2c Read Community	Community string	No	Use a community string match for authentication
	V1, V2c Write/Read Community	Community string	No	Use a community string match for authentication
SNMP V3	No-Auth	No	No	Use account with admin or user to access objects
	MD5 or SHA	Authentication based on MD5 or SHA	No	Provides authentication based on HMAC-MD5, or HMAC-SHA algorithms. 8-character passwords are the minimum requirement for authentication.
	MD5 or SHA	Authentication based on MD5 or SHA	Data encryption key	Provides authentication based on HMAC-MD5 or HMAC-SHA algorithms, and data encryption key. 8-character passwords and a data encryption key are the minimum requirements for authentication and encryption.

The following parameters can be configured on the **SNMP Agent** page. A more detailed explanation of each parameter is given below the following figure.



Enable

Setting	Description	Factory Default

Enable	Enables SNMP Agent	Disable
Disable	Disables SNMP Agent	

***Read community* (for V1, V2c, V3 or V1, V2c)**

Setting	Description	Factory Default
Read Community	Use a community string match with a maximum of 31 characters for authentication. This means that the SNMP agent can access all objects with read-only permissions using this community string.	public

***Write community* (for V1, V2c, V3 or V1, V2c)**

Setting	Description	Factory Default
Read /Write Community	Use a community string match with a maximum of 31 characters for authentication. This means that the SNMP agent can accesses all objects with read/write permissions using this community string.	private

SNMP agent version

Setting	Description	Factory Default
V1, V2c, V3, or V1, V2c, or V3 only	Select the SNMP protocol version used to manage the switch.	V1, V2c

***Admin auth type* (for V1, V2c, V3, and V3 only)**

Setting	Description	Factory Default
No Auth	Use admin account to access objects. No authentication	No Auth
MD5	Provide authentication based on the HMAC-MD5 algorithms. 8-character passwords are the minimum requirement for authentication.	
SHA	Provides authentication based on HMAC-SHA algorithms. 8-character passwords are the minimum requirement for authentication.	

***Admin private key* (for V1, V2c, V3, and V3 only)**

Setting	Description	Factory Default
Disable	No data encryption	Disable
DES	DES-based data encryption	
AES	AES-based data encryption	

Private Key

A data encryption key is the minimum requirement for data encryption (maximum of 63 characters)

Private MIB Information Device Object ID

Also know as ***OID***. This is the AWK-5232's enterprise value. It is fixed.

Storm Protection

In general, one host should not be allowed to occupy unlimited bandwidth, particularly when the device malfunctions. For example, so-called "broadcast storms" could be caused by an incorrectly configured topology or a malfunctioning device.

Storm Protection

Setting	Description	Factory Default
Enable/Disable	Enable or disable Broadcast Storm Protection globally for multicast packets	Enable

Multicast and flooding

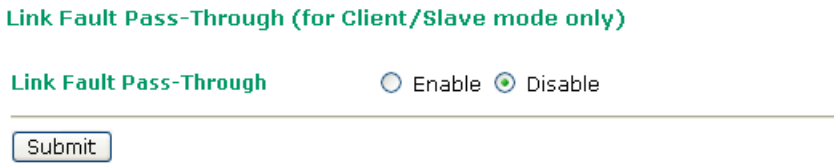
Setting	Description	Factory Default
Enable/Disable	If you enable Storm Protection, the Multicast and flooding option will show up. You can Enable or Disable Broadcast Storm Protection globally for unknown multicast and unknown unicast packets.	Disable

Link Fault Pass-Through (for Client/Slave mode only)

This function means if Ethernet port is link down, wireless connection will be forced to disconnect. Once Ethernet link is recovered, AWK will try to connect to AP.

If wireless is disconnected, AWK restarts auto-negotiation on Ethernet port but always stays in the link failure state. Once the wireless connection is recovered, AWK will try to recover the Ethernet link.

System log will indicate the link fault pass through events in addition to the original link up/down events.



Link Fault Pass-Through

Setting	Description	Factory Default
Enable	Enables Link Fault Pass-Through	Disable
Disable	Disables Link Fault Pass-Through	

Auto Warning Settings

Since industrial-grade devices are often located at the endpoints of a system, these devices will not always know what is happening elsewhere on the network. This means that these devices, including wireless APs or clients, must provide system maintainers with real-time alarm messages. Even when system administrators are out of the control room for an extended period, they can still be informed of the status of devices almost instantaneously when exceptions occur.

In addition to logging these events, the AWK-5232 supports different approaches to warn engineers automatically, such as SNMP trap, e-mail, and relay output. It also supports two digital inputs to integrate sensors into your system to automate alarms by email and relay output.

System Log

System Log Event Types

Detail information for grouped events is shown in the following table. You can check the box for **Enable log** to enable the grouped events. All default values are enabled (checked). The log for system events can be seen in **Status → System Log**.

System log Event Types

Event group	Enable log
System-related events	☑
Network-related events	☑
Config-related events	☑
Power events	☑
DI events	☑

System-related events	**Event is triggered when…**
System restart (warm start)	The AWK-5232 is rebooted, such as when its settings are changed (IP address, subnet mask, etc.).
Network-related events	**Event is triggered when…**
LAN 1 or LAN 2 link on	The LAN port is connected to a device or network.
LAN 1 or LAN 2 link off	The port is disconnected (e.g., the cable is pulled out, or the opposing device shuts down).
Client joined/ left for WLAN 1 or WLAN 2 (for Redundant AP, AP, or Master mode)	A wireless client is associated or disassociated.
WLAN 1 or WLAN 2 connected to AP (for Redundant Client, Client, or Slave mode)	The AWK-5232 is associated with an AP.
WLAN 1 or WLAN 2 disconnected (for Redundant Client, Client, or Slave mode)	The AWK-5232 is disassociated from an AP.
Config-related events	**Event is triggered when…**
Configuration Changed	A configuration item has been changed.
Configuration file import via Web Console	The configuration file is imported to the AWK-5232.
Console authentication failure	An incorrect password is entered.
Firmware upgraded	The AWK-5232's firmware is updated.
Power events	**Event is triggered when…**
Power 1/2 transition (On → Off)	The AWK-5232 is powered down in PWR1/2.
PoE transition (On → Off)	The AWK-5232 is powered down in PoE.
Power 1/2 transition (Off → On)	The AWK-5232 is powered via PWR1/2.
PoE transition (Off → On)	The AWK-5232 is powered via PoE.
DI events	**Event is triggered when…**
DI1/2 transition (On → Off)	Digital Input 1/2 is triggered by on to off transition
DI1/2 transition (Off → On)	Digital Input 1/2 is triggered by off to on transition

Syslog

This function provides the event logs for the Syslog server. The function supports up to three configurable Syslog servers and Syslog server UDP port numbers. When an event occurs, the event will be sent as a Syslog UDP packet to the specified Syslog servers.

Syslog Event Types

Detail information for the grouped events is shown in the following table. You can check the box for **Enable log** to enable the grouped events. All default values are enabled (checked). Details for each event group can be found on the "System log Event Types" table on page 3-31.

Syslog Event Types

Event group	Enable log
System-related events	☑
Network-related events	☑
Config-related events	☑
Power events	☑
DI events	☑

Syslog Server Settings

You can configure the parameters for your Syslog servers in this page.

Syslog Server Settings

Syslog server 1	
Syslog port	514
Syslog server 2	
Syslog port	514
Syslog server 3	
Syslog port	514

Syslog server 1 / 2 / 3

Setting	Description	Factory Default
IP address	Enter the IP address of the 1st/ 2nd/ 3rd Syslog Server	None

Syslog port

Setting	Description	Factory Default
Port destination (1 to 65535)	Enter the UDP port of the corresponding Syslog server	514

E-mail

E-mail Event Types

Check the box for **Active** to enable the event items. All default values are deactivated (unchecked). Details for each event item can be found on the “System log Event Types” table on page 3-39.

E-mail Event Types

Event	Active
Cold start	☐
Warm start	☐
Power 1 transition (On-->Off)	☐
Power 1 transition (Off-->On)	☐
Power 2 transition (On-->Off)	☐
Power 2 transition (Off-->On)	☐
PoE transition (On-->Off)	☐
PoE transition (Off-->On)	☐
Configuration changed	☐
Console authentication failure	☐
DI 1 transition (On-->Off)	☐
DI 1 transition (Off-->On)	☐
DI 2 transition (On-->Off)	☐
DI 2 transition (Off-->On)	☐
LAN 1 link On	☐
LAN 1 link Off	☐
LAN 2 link On	☐
LAN 2 link Off	☐

E-mail Server Settings

You can set up to 4 e-mail addresses to receive alarm emails from the AWK-5232. The following parameters can be configured on the **E-mail Server Settings** page. In addition, a **Send Test Mail** button can be used to test whether the Mail server and e-mail addresses work well. More detailed explanations about these parameters are given after the following figure.

E-mail Server Settings

Mail server (SMTP)
User name
Password
From e-mail address
To e-mail address 1
To e-mail address 2
To e-mail address 3
To e-mail address 4

Submit Send Test Mail

Mail server (SMTP)

Setting	Description	Factory Default
IP address	The IP Address of your email server.	None

User name & Password

Setting	Description	Factory Default
	User name and password used in the SMTP server	None

From e-mail address

Setting	Description	Factory Default
Max. 63 characters	Enter the administrator's e-mail address which will be shown in the "From" field of a warning e-mail.	None

To E-mail address 1 / 2 / 3 / 4

Setting	Description	Factory Default
Max. 63 characters	Enter the receivers' e-mail addresses.	None

Relay

The AWK-5232 has one relay output, which consists of 2 terminal block contacts on the AWK-5232's top panel. These relay contacts are used to indicate user-configured events and system failure.

The two wires attached to the relay contacts form an open circuit when a user-configured event is triggered. If a user-configured event does not occur, the relay circuit will remain closed. For safety reasons, the relay circuit is kept open when the AWK-5232 is not powered.

Relay Event Types

You can check the box for **Active** to enable the event items. All default values are deactivated (unchecked). Details for each event item can be found in the "System log Event Types" table on page 3-31.

Relay Event Types

Event	Active
Power 1 transition (On-->Off)	☐
Power 2 transition (On-->Off)	☐
PoE transition (On-->Off)	☐
DI 1 transition (On-->Off)	☐
DI 1 transition (Off-->On)	☐
DI 2 transition (On-->Off)	☐
DI 2 transition (Off-->On)	☐
LAN 1 link On	☐
LAN 1 link Off	☐
LAN 2 link On	☐
LAN 2 link Off	☐

Trap

Traps can be used to signal abnormal conditions (notifications) to a management station. This trap-driven notification can make your network more efficient.

Because a management station usually takes care of a large number of devices that have a large number of objects, it will be overloading for the management station to poll or send requests to query every object on every device. It would be better if the managed device agent could notify the management station by sending a message known as a trap for the event.

Trap Event Types

Trap Event Types

Event	Active
Cold start	☐
Warm start	☐
Power 1 transition (On-->Off)	☐
Power 1 transition (Off-->On)	☐
Power 2 transition (On-->Off)	☐
Power 2 transition (Off-->On)	☐
PoE transition (On-->Off)	☐
PoE transition (Off-->On)	☐
Configuration changed	☐
Console authentication failure	☐
DI 1 transition (On-->Off)	☐
DI 1 transition (Off-->On)	☐
DI 2 transition (On-->Off)	☐
DI 2 transition (Off-->On)	☐
LAN 1 link On	☐
LAN 1 link Off	☐
LAN 2 link On	☐
LAN 2 link Off	☐

SNMP Trap Receiver Settings

SNMP traps are defined in SMIv1 MIBs (SNMPv1) and SMIv2 MIBs (SNMPv2c). The two styles are basically equivalent, and it is possible to convert between the two. You can set the parameters for SNMP trap receivers through the web page.

SNMP Trap Receiver Settings

1st Trap version	V1
1st Trap server IP/name	V1 / V2
1st Trap community	alert
2nd Trap version	V1
2nd Trap server IP/name	
2nd Trap community	alert

1st / 2nd Trap version

Setting	Description	Factory Default
V1	SNMP trap defined in SNMPv1	V1
V2	SNMP trap defined in SNMPv2	

1st / 2nd Trap server IP/name

Setting	Description	Factory Default
IP address or host name	Enter the IP address or name of the trap server used by your network.	None

1st / 2nd Trap community

Setting	Description	Factory Default
Max. 31 characters	Use a community string match with a maximum of 31 characters for authentication.	alert

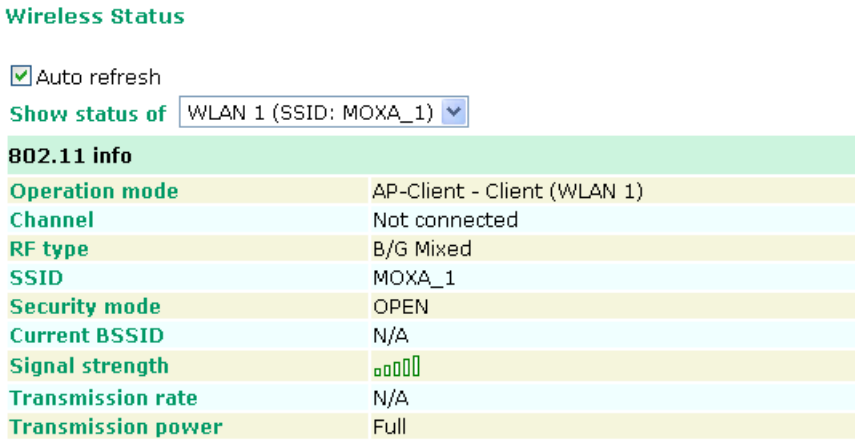
Status

Wireless Status

The status for **802.11 info** parameters, such as Operation mode and Channel, are shown on the **Wireless Status** page. The status will refresh every 5 seconds if the **Auto refresh** box is checked.

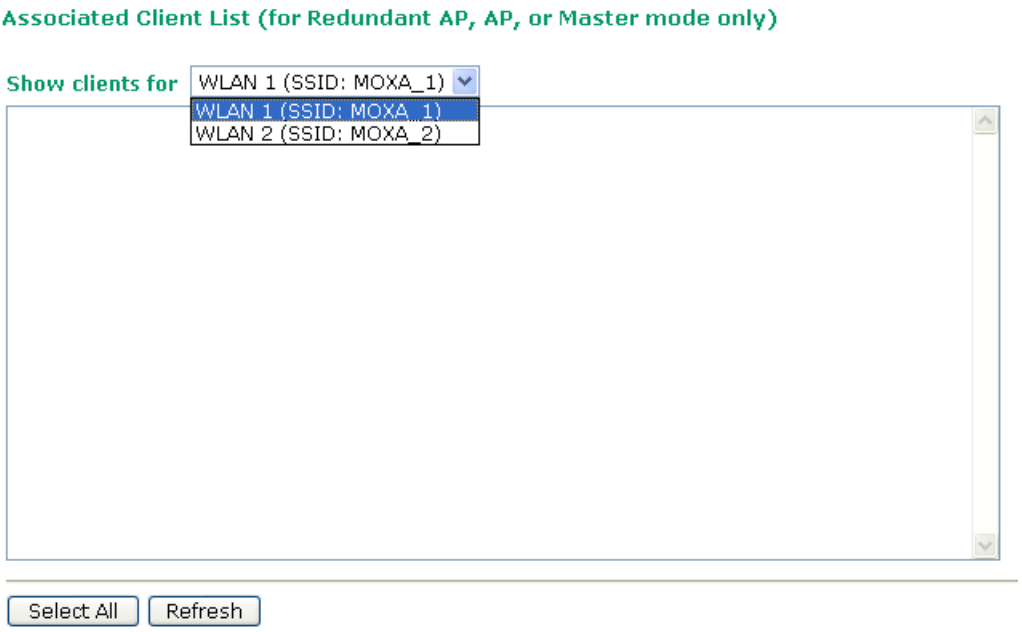
Certain values for **802.11 info** may not appear with different operation modes. For example, **Current BSSID** and **RSSI** are not available in Redundant AP, AP, or Master modes.

It is helpful to use the continuously updated information option on this page, such as RSSI, to monitor the signal strength of the AWK-5232 in Redundant Client, Client, or Slave modes.



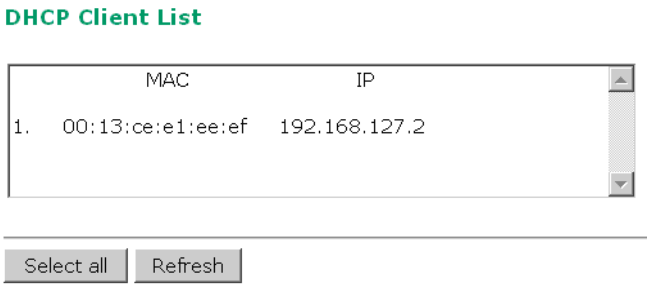
Associated Client List (for Redundant AP, AP, or Master mode only)

Associated Client List shows all the clients that are currently associated to a particular AWK-5232. You can click **Select all** to select all the content in the list for further editing. You can click **Refresh** to refresh the list.

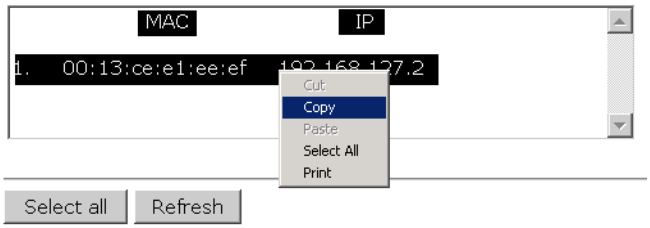

Associated Client List (for Redundant AP, AP, or Master mode only)
Show clients for
WLAN 1 (SSID: MOXA_1)
WLAN 1 (SSID: MOXA_1)
WLAN 2 (SSID: MOXA_2)
Select All
Refresh

DHCP Client List (for AP mode only)

When you enable the DHCP server, the DHCP Client List shows all the clients that require and have successfully received IP assignments. You can click the **Refresh** button to refresh the list.



You can press **Select all** button to select all content in the list for further editing.



System Log

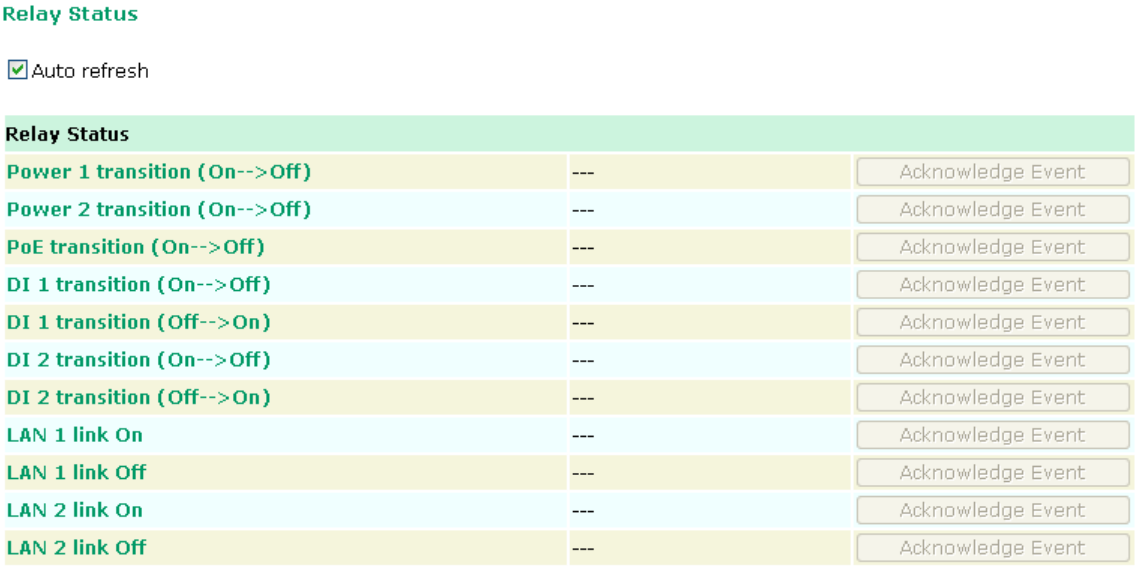
Triggered events are recorded in System Log. You can export the log contents to an available viewer by clicking **Export Log**. You can use the **Clear Log** button to clear the log contents and the **Refresh** button to refresh the log.

System log
(196) 2009/06/18,16h:31m:52s Power 1 transition (Off -> On)
(197) 2009/06/18,16h:32m:16s LAN 1 link on
(198) 2009/06/18,16h:32m:17s LAN 2 link on
(199) 2009/06/18,16h:32m:33s RSTP topology changed
(200) 2009/06/18,16h:32m:33s LAN 1 link off
(201) 2009/06/18,16h:32m:34s LAN 2 link off
(202) 2009/06/18,16h:32m:43s LAN 1 link on
(203) 2009/06/18,16h:32m:45s LAN 2 link on
(204) 2009/06/18,16h:33m:13s RSTP topology changed
(205) 2009/06/18,16h:33m:53s RSTP topology changed
(206) 2009/06/18,16h:34m:31s RSTP topology changed
(207) 2009/06/18,16h:35m:09s RSTP topology changed
(208) 2009/06/18,19h:10m:17s System cold start
(209) 2009/06/18,19h:10m:17s Power 1 transition (Off -> On)
(210) 2009/06/18,19h:10m:53s LAN 1 link on
(211) 2009/06/18,19h:11m:01s LAN 1 link off
(212) 2009/06/18,19h:11m:08s LAN 2 link on
(213) 2009/06/18,19h:11m:39s RSTP topology changed
Export Log
Clear Log
Refresh

Relay Status

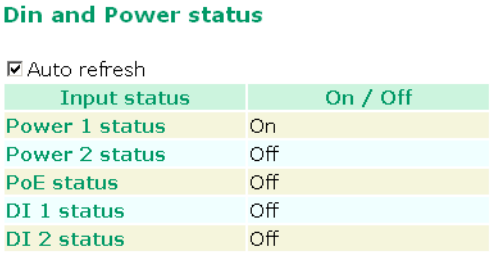
The status of user-configurable events can be found under **Relay Status**. The status will refresh every 5 seconds if the **Auto refresh** box is checked.

If an event is triggered, it will be noted on this list. System administrators can click **Acknowledge Event** when he has acknowledged the event and addressed it.


Relay Status
Auto refresh
Relay Status
Power 1 transition (On-->Off) --- Acknowledge Event
Power 2 transition (On-->Off) --- Acknowledge Event
PoE transition (On-->Off) --- Acknowledge Event
DI 1 transition (On-->Off) --- Acknowledge Event
DI 1 transition (Off-->On) --- Acknowledge Event
DI 2 transition (On-->Off) --- Acknowledge Event
DI 2 transition (Off-->On) --- Acknowledge Event
LAN 1 link On --- Acknowledge Event
LAN 1 link Off --- Acknowledge Event
LAN 2 link On --- Acknowledge Event
LAN 2 link Off --- Acknowledge Event

DI and Power Status

The status of power inputs and digital inputs is shown on this web page. The status will refresh every 5 seconds if the **Auto refresh** box is checked.

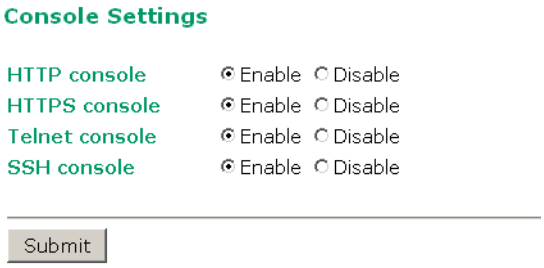


Maintenance

Maintenance functions provide the administrator with tools to manage the AWK-5232 and wired/wireless networks.

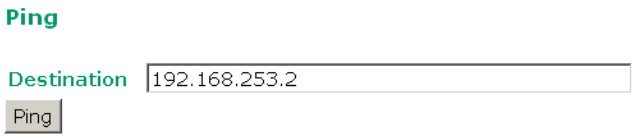
Console Settings

You can enable or disable access permission for the following consoles: HTTP, HTTPS, Telnet and SSH connections. For more security, we recommend you only allow access to the two secured consoles, HTTPS and SSH.

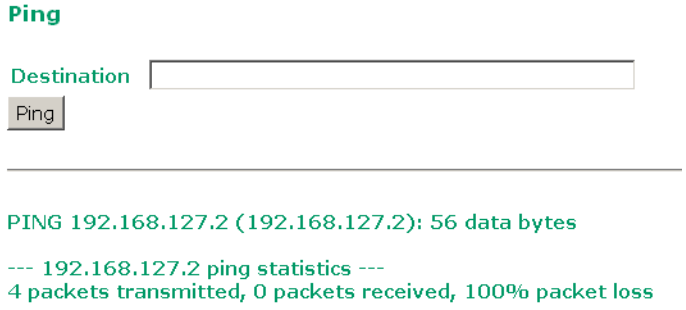


Ping

Ping helps to diagnose the integrity of wired or wireless networks. By inputting a node's IP address in the **Destination** field, you can use the **ping** command to make sure it exists and whether or not the access path is available.



If the node and access path are available, you will see that all packets were successfully transmitted with no loss. Otherwise, some, or even all, packets may get lost, as shown in the following figure.



Firmware Upgrade

The AWK-5232 can be enhanced with more value-added functions by installing firmware upgrades. The latest firmware is available at Moxa's download center.

Before running a firmware upgrade, make sure the AWK-5232 is off-line. Click the **Browse** button to specify the firmware image file and click **Firmware Upgrade and Restart** to start the firmware upgrade. After the progress bar reaches 100%, the AWK-5232 will reboot itself.

When upgrading your firmware, the AWK-5232's other functions are forbidden.

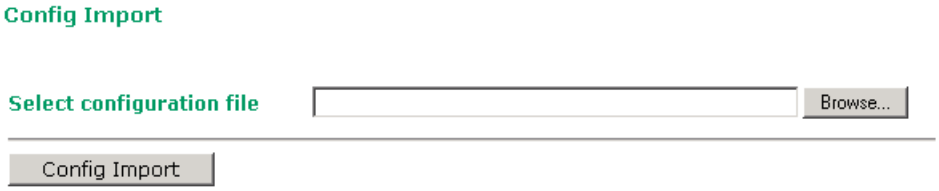
ATTENTION

Please make sure the power source is stable when you upgrade your firmware. An unexpected power breakup may damage your AWK-5232.

Config Import Export

You can back up or restore the AWK-5232's configuration with **Config Import Export**.

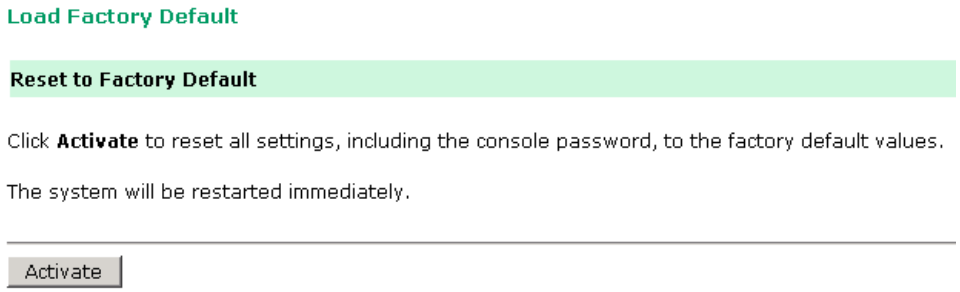
In the **Config Import** section, click **Browse** to specify the configuration file and click **Config Import** button to begin importing the configuration.



In the **Config Export** section, click the **Config Export** button and save the configuration file onto your local storage media. The configuration file is a text file and you can view and edit it with a general text-editing tool.

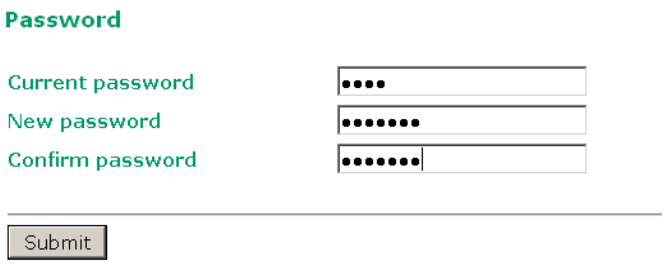
Load Factory Default

Use this function to reset the AWK-5232 and roll all settings back to the factory default values. You can also reset the hardware by pressing the reset button on the top panel of the AWK-5232.


Load Factory Default
Reset to Factory Default
Click Activate to reset all settings, including the console password, to the factory default values.
The system will be restarted immediately.
Activate

Password

You can change the administration password for each of the AWK-5232's console managers by using the **Password** function. Before you set up a new password, you must input the current password and reenter the new password for confirmation. For your security, do not use the default password ***root***, and remember to change the administration password regularly.



Misc. Settings

Additional settings to help you manage your AWK-5232, are available on this page.

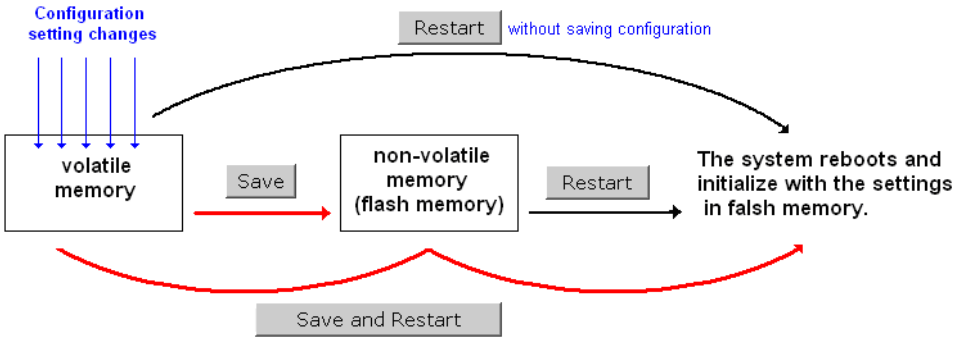
Reset button

Setting	Description	Factory Default
Always enable	The AWK-5232's Reset button works normally.	Always enable
Disable after 60 sec	The AWK-5232's Reset button will become invalid 60 seconds after the AWK-5232 completes booting.	

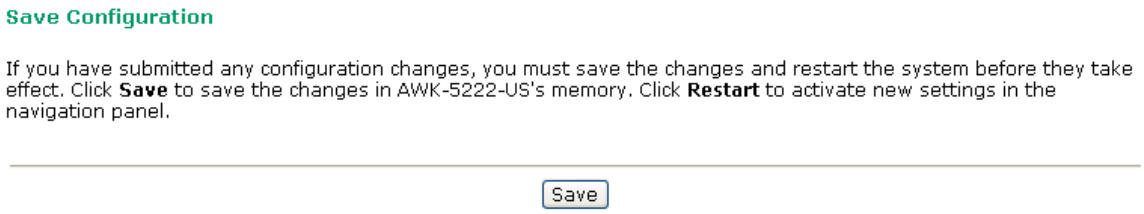
Save Configuration

The following figure shows how the AWK-5232 stores the setting changes into volatile and non-volatile memory. All data stored in volatile memory will disappear when the AWK-5232 is shutdown or rebooted unless they are **y**. Because the AWK-5232 starts up and initializes with the settings stored in flash memory, all new changes must be saved to flash memory before restarting the AWK-5232.

This also means the new changes will not work unless you run either the **Save Configuration** function or the **Restart** function.



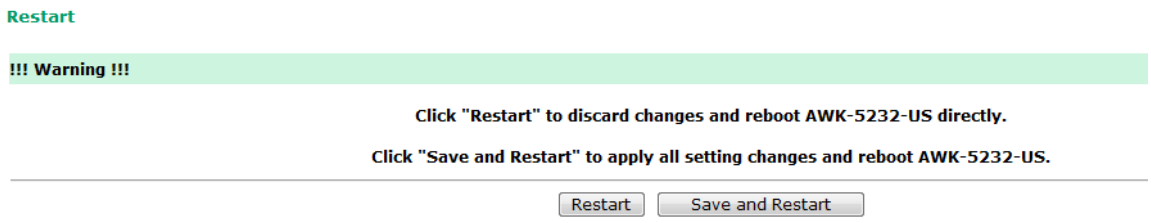
After you click on **Save Configuration** in the left menu box, the following screen will appear. Click **Save** if you wish to update the configuration settings in the flash memory at this time. Alternatively, you may choose to run other functions and put off saving the configuration until later. However, the new setting changes will remain in the non-volatile memory until you save the configurations.


Save Configuration
If you have submitted any configuration changes, you must save the changes and restart the system before they take effect. Click Save to save the changes in AWK-5222-US's memory. Click Restart to activate new settings in the navigation panel.
Save

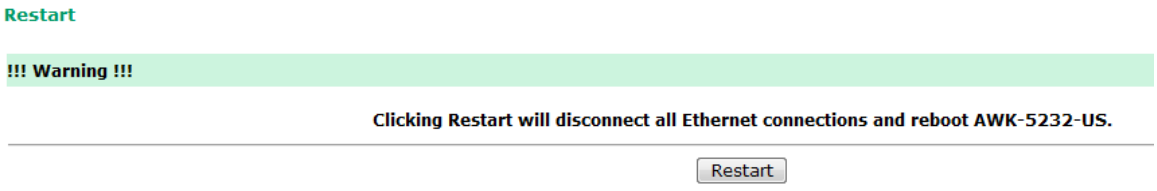
Restart

If you submitted configuration changes, you will find a blinking string in the upper right corner of the screen. After making all your changes, click the **Restart** function in the left menu box. One of two different screens will appear.

If you made changes recently but did not save, you will be given two options. Clicking the **Restart** button here will reboot the AWK-5232 directly, and all setting changes will be ignored. Clicking the **Save and Restart** button will apply all setting changes and then reboot the AWK-5232.


Restart
!!! Warning !!!
Click "Restart" to discard changes and reboot AWK-5232-US directly.
Click "Save and Restart" to apply all setting changes and reboot AWK-5232-US.
Restart
Save and Restart

If you run the **Restart** function without changing any configurations or saving all your changes, you will see just one **Restart** button on your screen.



You will not be able to run any of the AWK-5232's functions while the system is rebooting.

Logout

Logout helps users disconnect the current HTTP or HTTPS session and go to the Login page. For security reasons, we recommend you logout before quitting the console manager.

4

Software Installation/Configuration

The following topics are covered in this chapter:

- **Overview**
- **AWK Search Utility**
  - Installing AWK Search Utility
  - Configuring AWK Search Utility

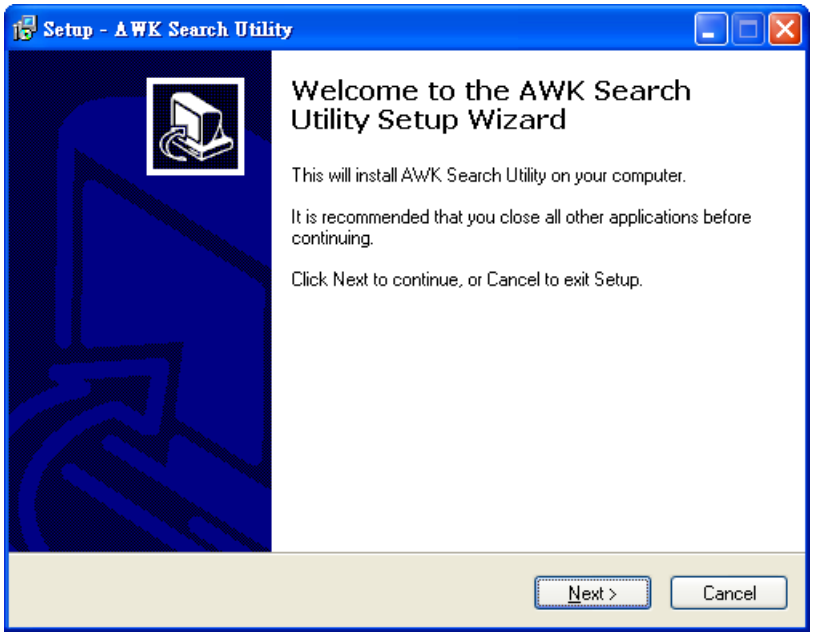
Overview

The Documentation & Software CD included with your AWK-5232 is designed to make the installation and configuration procedure easy and straightforward. This auto-run CD includes AWK Search Utility (to broadcast search for all AWK's accessible over the network), the AWK-5232 User's Manual, and Quick Installation Guide.

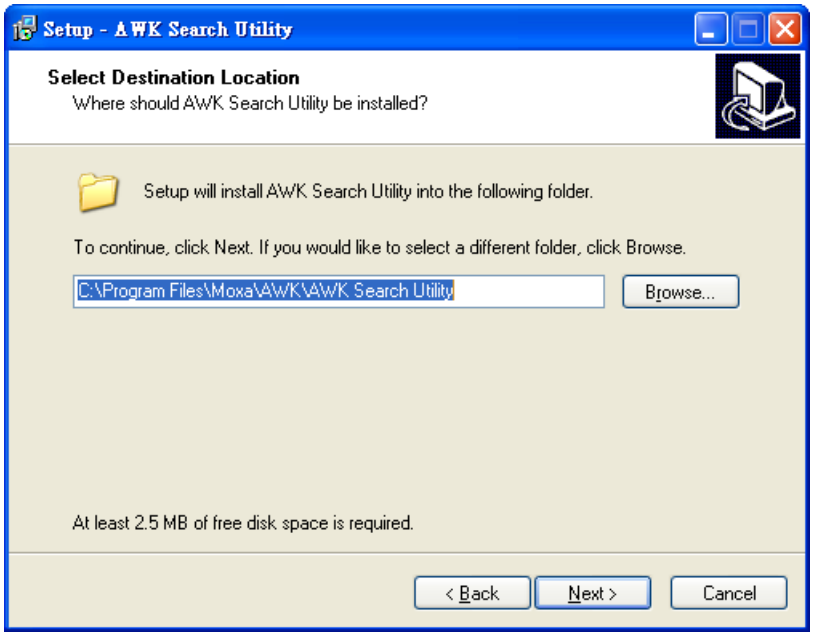
AWK Search Utility

Installing AWK Search Utility

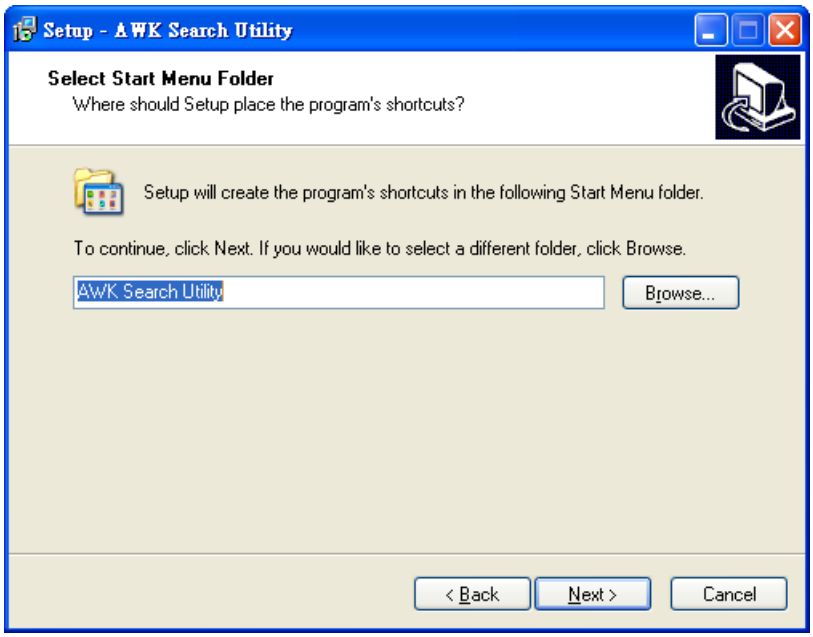
1. Click the **INSTALL UTILITY** button in the AWK Installation CD auto-run window to install AWK Search Utility. Once the program starts running, click **Yes** to proceed.
2. Click **Next** when the Welcome screen opens to proceed with the installation.


Setup - AWK Search Utility
Welcome to the AWK Search Utility Setup Wizard
This will install AWK Search Utility on your computer.
It is recommended that you close all other applications before continuing.
Click Next to continue, or Cancel to exit Setup.
Next >
Cancel

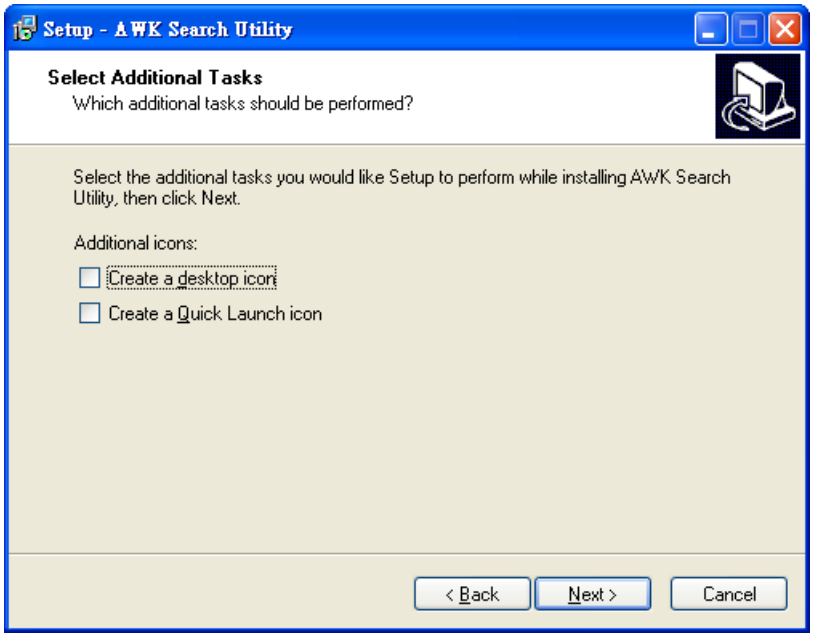
3. Click **Next** to install program files to the default directory, or click **Browse** to select an alternate location.


Setup - AWK Search Utility
Select Destination Location
Where should AWK Search Utility be installed?
Setup will install AWK Search Utility into the following folder.
To continue, click Next. If you would like to select a different folder, click Browse.
C:\Program Files\Moxa\AWK\AWK Search Utility
Browse...
At least 2.5 MB of free disk space is required.
< Back
Next >
Cancel

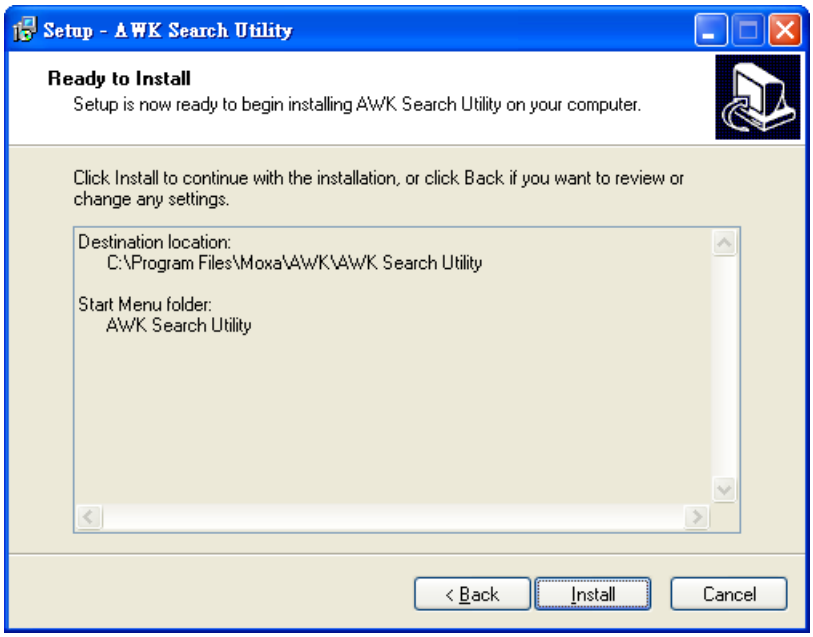
4. Click **Next** to create the program's shortcut files to the default directory, or click **Browse** to select an alternate location.


Setup - AWK Search Utility
Select Start Menu Folder
Where should Setup place the program's shortcuts?
Setup will create the program's shortcuts in the following Start Menu folder.
To continue, click Next. If you would like to select a different folder, click Browse.
AWK Search Utility
Browse...
< Back
Next >
Cancel

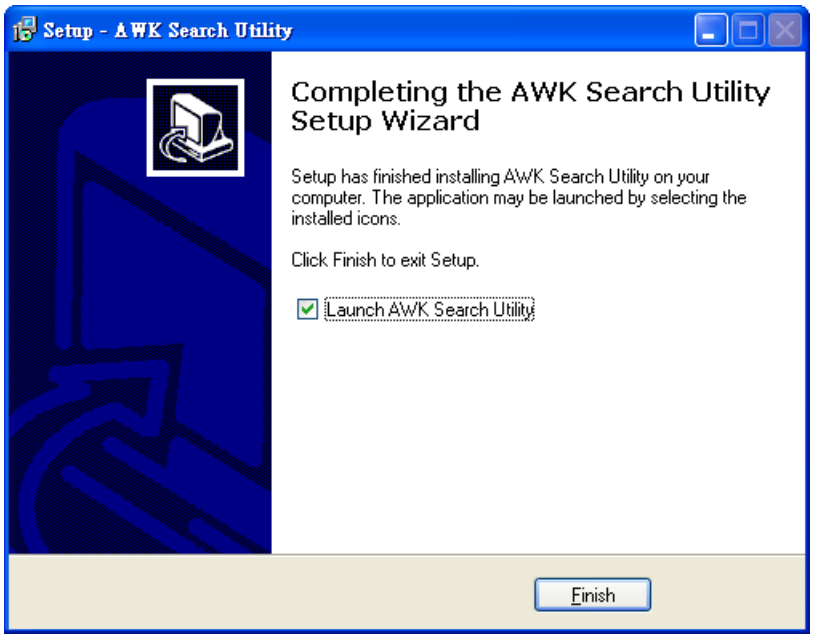
5. Click **Next** to select additional tasks.


Setup - AWK Search Utility
Select Additional Tasks
Which additional tasks should be performed?
Select the additional tasks you would like Setup to perform while installing AWK Search Utility, then click Next.
Additional icons:
Create a desktop icon
Create a Quick Launch icon
< Back
Next >
Cancel

6. Click **Next** to proceed with the installation. The installer then displays a summary of the installation options.


Setup - AWK Search Utility
Ready to Install
Setup is now ready to begin installing AWK Search Utility on your computer.
Click Install to continue with the installation, or click Back if you want to review or change any settings.
Destination location:
C:\Program Files\Moxa\AWK\AWK Search Utility
Start Menu folder:
AWK Search Utility
< Back
Install
Cancel

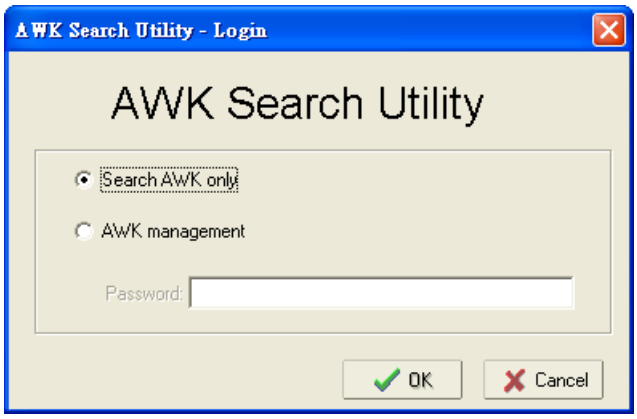
7. Click **Install** to begin the installation. The setup window will report the progress of the installation. To change the installation settings, click **Back** and navigate to the previous screen.
8. Click **Finish** to complete the installation of AWK Search Utility.


Setup - AWK Search Utility
Completing the AWK Search Utility Setup Wizard
Setup has finished installing AWK Search Utility on your computer. The application may be launched by selecting the installed icons.
Click Finish to exit Setup.
Launch AWK Search Utility
Finish

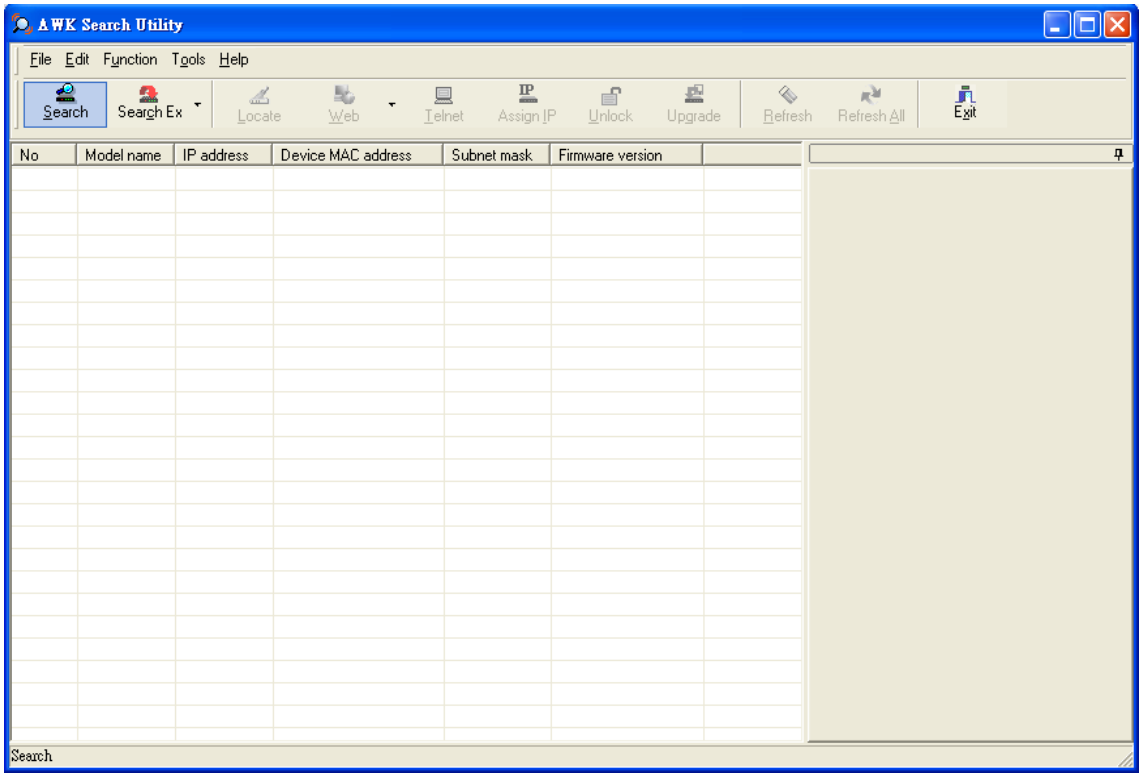
Configuring AWK Search Utility

The Broadcast Search function is used to locate all AWK-5232 APs that are connected to the same LAN as your computer. After locating an AWK-5232, you will be able to change its IP address. Since the Broadcast Search function searches by TCP packet and not IP address, it doesn't matter if the AWK-5232 is configured as an AP or Client. In either case, APs and Clients connected to the LAN will be located, regardless of whether or not they are part of the same subnet as the host.

1. Start the **AWK Search Utility** program. When the Login page appears, select the "Search AWK only" option to search for AWKs and to view each AWK's configuration. Select the "AWK management" option to assign IPs, upgrade firmware, and locate devices.

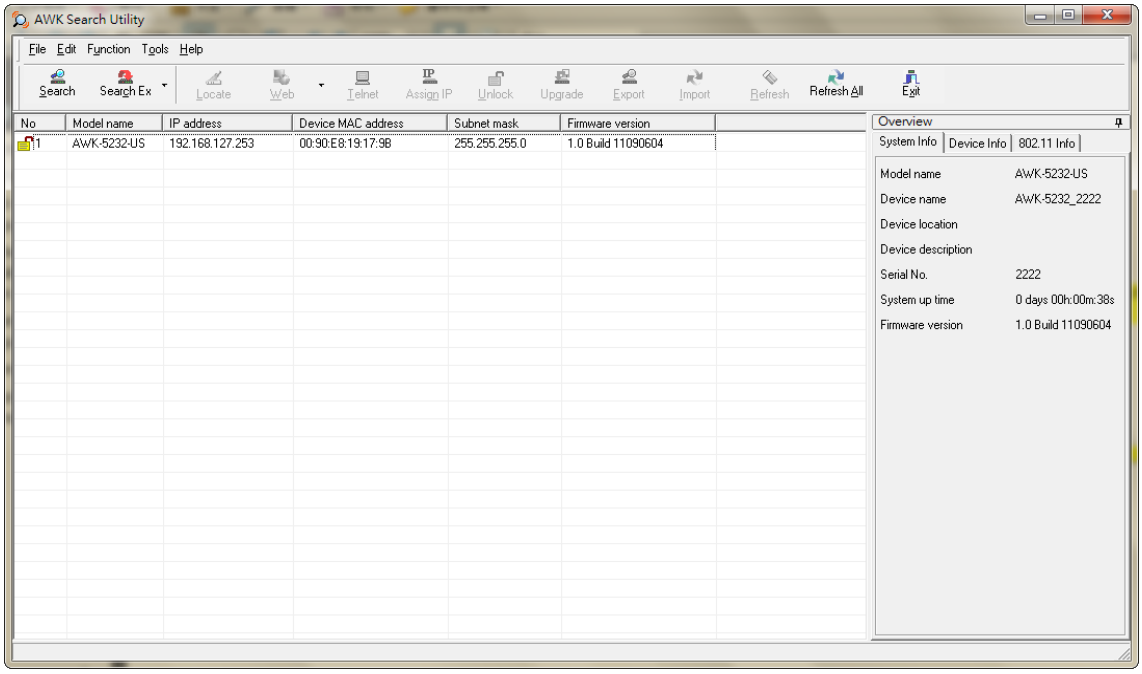


2. Open the AWK Search Utility and then click the **Search** icon.

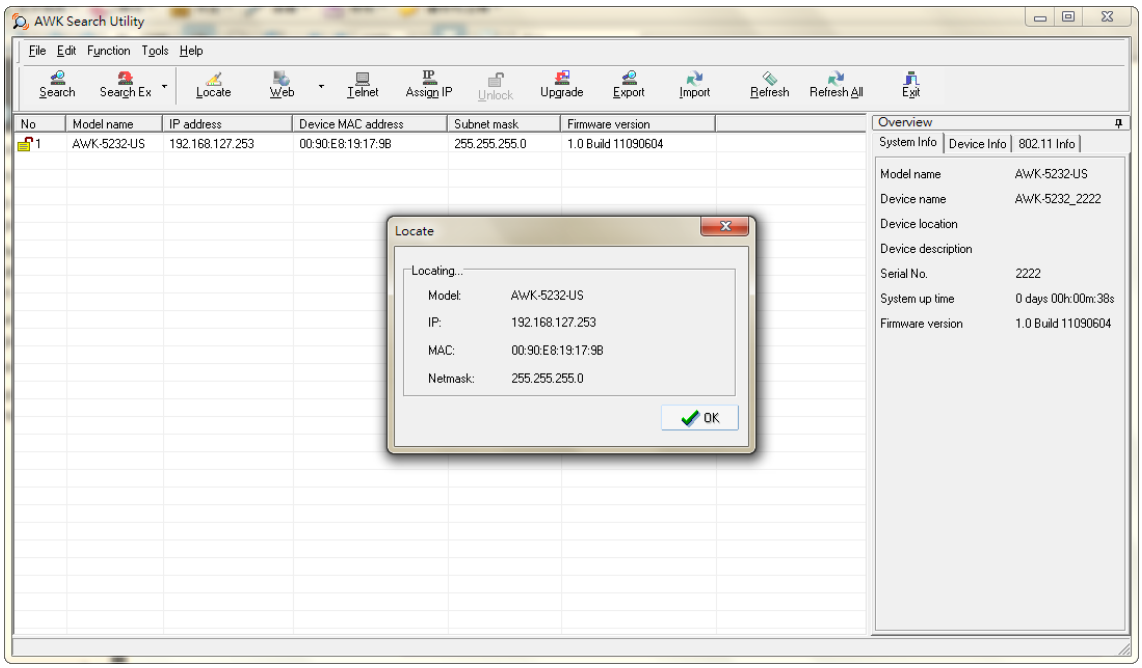


The "Searching" window indicates the progress of the search.

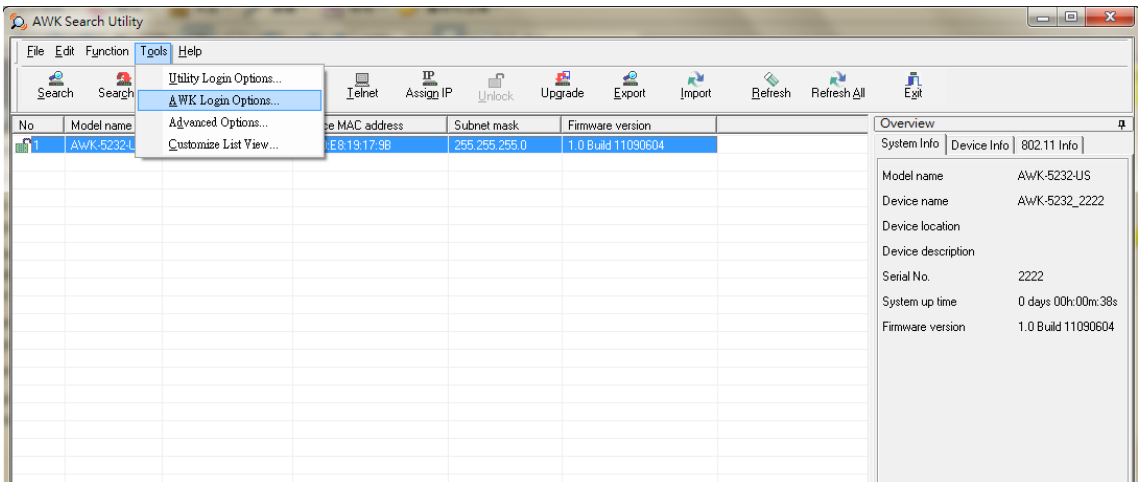
3. When the search is complete, all AWKs that were located will be displayed in the AWK Search Utility window.



Click **Locate** to cause the selected device to beep.



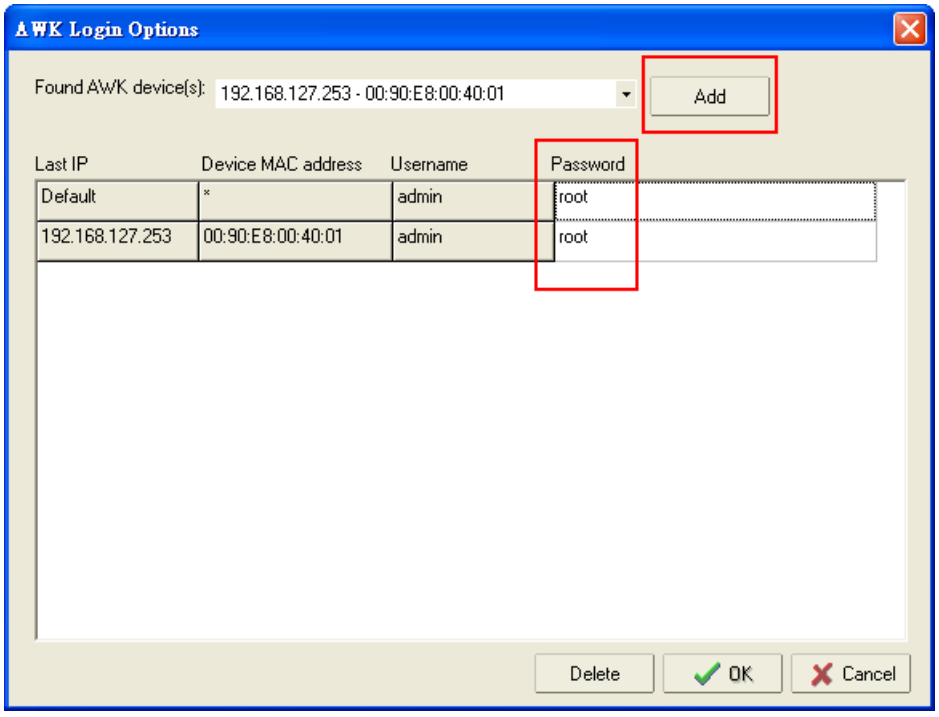
Make sure your AWK is **unlocked** before using the search utility's icons setting. The AWK will unlock automatically if the password is set to the default. Otherwise you must enter the new password manually. Go to **Tools → AWK login Options** to manage and unlock additional AWKs.



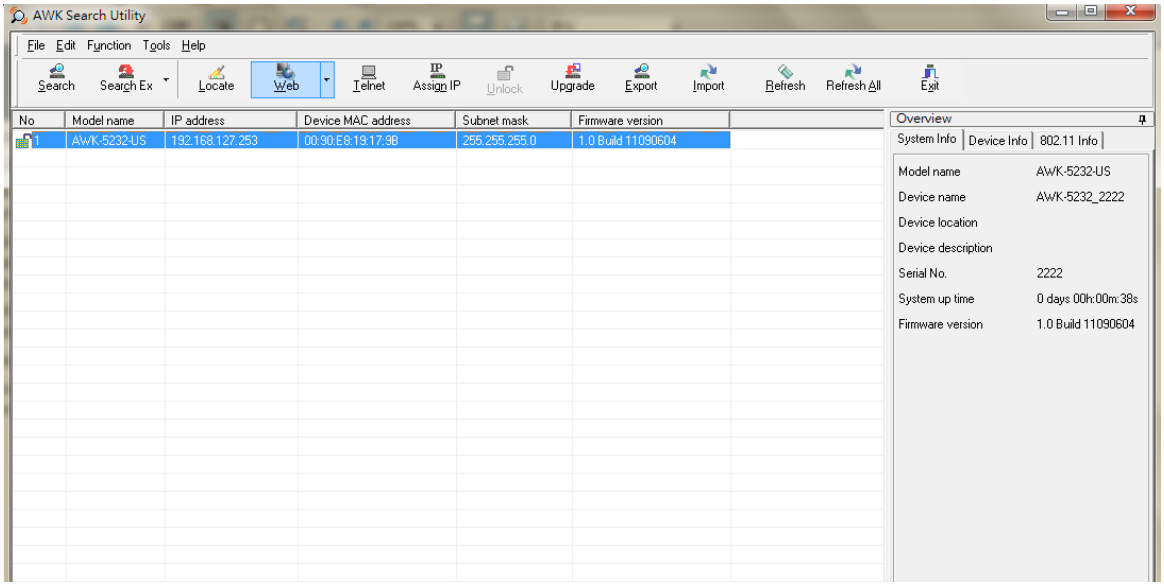
Use the scroll down list to select the MAC addresses of those AWKs you would like to manage, and then click **Add**. Key in the password for the AWK device and then click **OK** to save. If you return to the search page and search for the AWK again, you will find that the AWK will unlock automatically.

ATTENTION

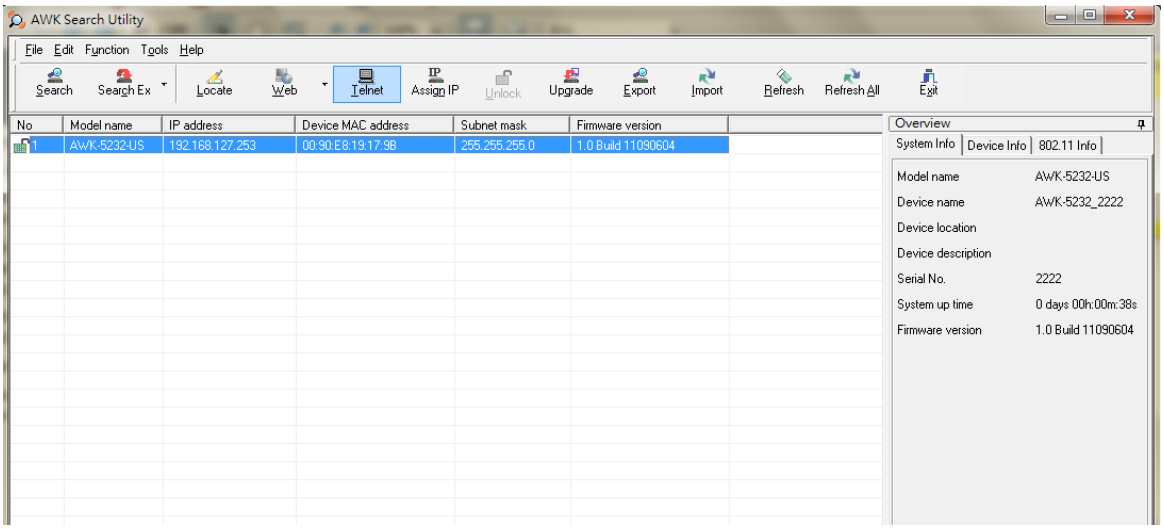
For security purposes, we suggest you can change the AWK search utility login password instead of using default.



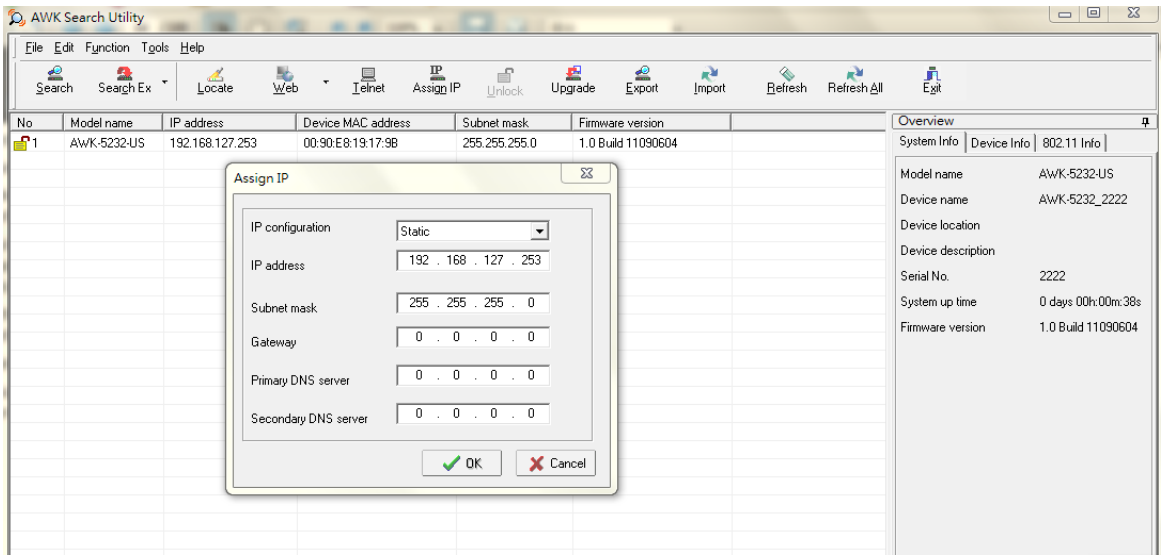
To modify the configuration of the highlighted AWK, click on the Web icon to open the web console. This will take you to the web console, where you can make all configuration changes. Refer to Chapter 3, “Using the Web Console,” for information on how to use the web console.


AWK Search Utility
File Edit Function Tools Help
Search Search Ex Locate Web Telnet Assign IP Unlock Upgrade Export Import Refresh Refresh All Exit
No Model name IP address Device MAC address Subnet mask Firmware version
1 AWK-5232-US 192.168.127.253 00:90:E8:19:17:9B 255.255.255.0 1.0 Build 11090604
Overview
System Info Device Info 802.11 Info
Model name AWK-5232-US
Device name AWK-5232_2222
Device location
Device description
Serial No. 2222
System up time 0 days 00h:00m:38s
Firmware version 1.0 Build 11090604

Click on **Telnet** if you would like to use telnet to configure your AWKs.


AWK Search Utility
File Edit Function Tools Help
Search Search Ex Locate Web Telnet Assign IP Unlock Upgrade Export Import Refresh Refresh All Exit
No Model name IP address Device MAC address Subnet mask Firmware version
1 AWK-5232-US 192.168.127.253 00:90:E8:19:17:9B 255.255.255.0 1.0 Build 11090604
Overview
System Info Device Info 802.11 Info
Model name AWK-5232-US
Device name AWK-5232_2222
Device location
Device description
Serial No. 2222
System up time 0 days 00h:00m:38s
Firmware version 1.0 Build 11090604

Click **Assign IP** to change the IP setting.

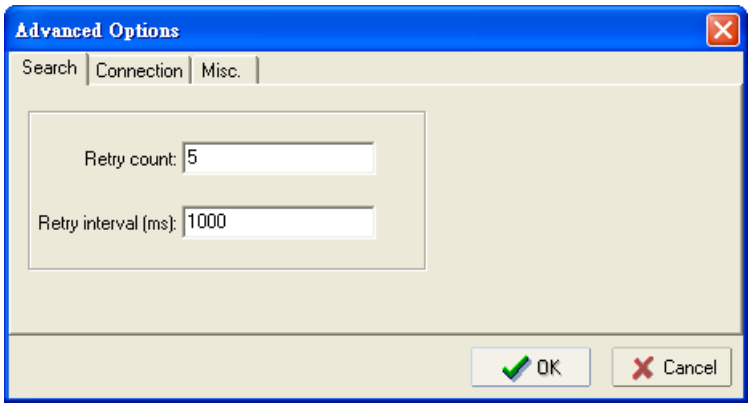

AWK Search Utility
File Edit Function Tools Help
Search Search Ex Locate Web Telnet Assign IP Unlock Upgrade Export Import Refresh Refresh All Exit
No Model name IP address Device MAC address Subnet mask Firmware version
1 AWK-5232-US 192.168.127.253 00:90:E8:19:17:9B 255.255.255.0 1.0 Build 11090604
Assign IP
IP configuration Static
IP address 192 . 168 . 127 . 253
Subnet mask 255 . 255 . 255 . 0
Gateway 0 . 0 . 0 . 0
Primary DNS server 0 . 0 . 0 . 0
Secondary DNS server 0 . 0 . 0 . 0
OK Cancel
Overview
System Info Device Info 802.11 Info
Model name AWK-5232-US
Device name AWK-5232_2222
Device location
Device description
Serial No. 2222
System up time 0 days 00h:00m:38s
Firmware version 1.0 Build 11090604

The three advanced options—**Search**, **Connection**, and **Miscellaneous**—are explained below:

Search

Retry count (default=5): Indicates how many times the search will be retried automatically.

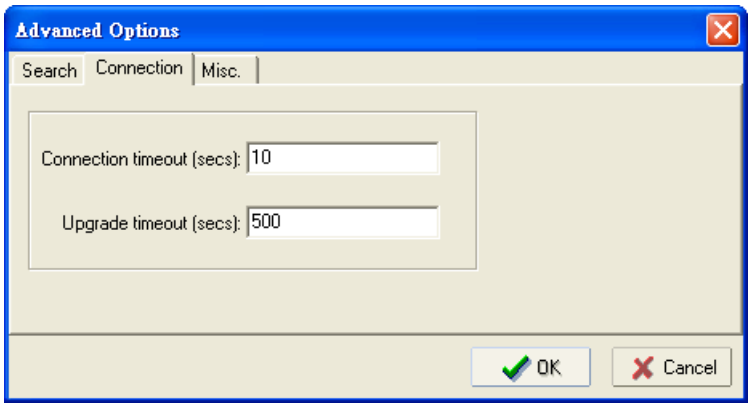
Retry interval (ms): The time lapsed between retries.



Connection

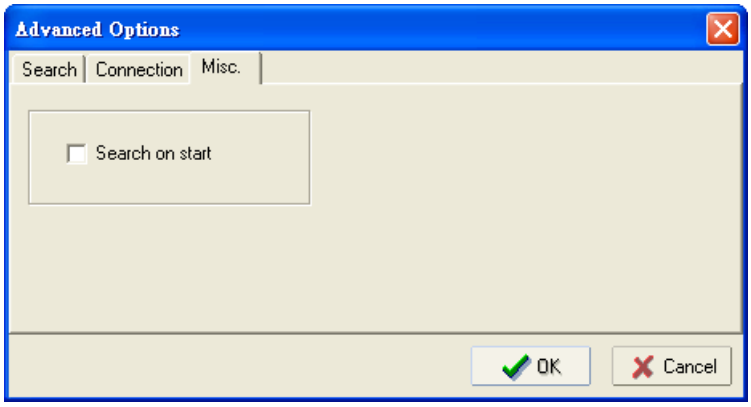
Connection timeout (secs): Use this option to set the waiting time for the **Default Login**, **Locate**, **Assign IP**, **Upload Firmware**, and **Unlock** to complete.

Upgrade timeout (secs): Use this option to set the waiting time for the connection to disconnect while the firmware is upgrading. Use this option to set the waiting time for the Firmware to write to flash.



Misc.

Search on start: Checkmark this box if you would like the search function to start searching for devices after you log in to the AWK search Utility.



5

Other Console Configurations

This chapter explains how to access the AWK-5232 for the first time. In addition to HTTP access, there are four ways to access AWK-5232: serial console, Telnet console, SSH console, and HTTPS console. The serial console connection method, which requires using a short serial cable to connect the AWK-5232 to a PC's COM port, can be used if you do not know the AWK-5232's IP address. The other consoles can be used to access the AWK-5232 over an Ethernet LAN, or over the Internet.

The following topics are covered in this chapter:

- **RS-232 Console Configuration (115200, None, 8, 1, VT100)**
- **Configuration by Telnet and SSH Consoles**
- **Configuration by Web Browser with HTTPS/SSL**
- **Disabling Telnet and Browser Access**

ATTENTION

1. You **CANNOT** connect to the AWK-5232 by two or more of these console configurations simultaneously.
2. You can connect to the AWK-5232 simultaneously by web browser and serial/ Telnet /SSH console. However, we strongly suggest that you do **NOT** use more than one connection method at the same time. Following this advice will allow you to maintain better control over the configuration of your AWK-5232.

RS-232 Console Configuration (115200, None, 8, 1, VT100)

The serial console connection method, which requires using a short serial cable to connect the AWK-5232 to a PC's COM port, can be used if you do not know the AWK-5232's IP address. It is also convenient to use serial console configurations when you cannot access the AWK-5232 over Ethernet LAN, such as in the case of LAN cable disconnections or broadcast storming over the LAN.

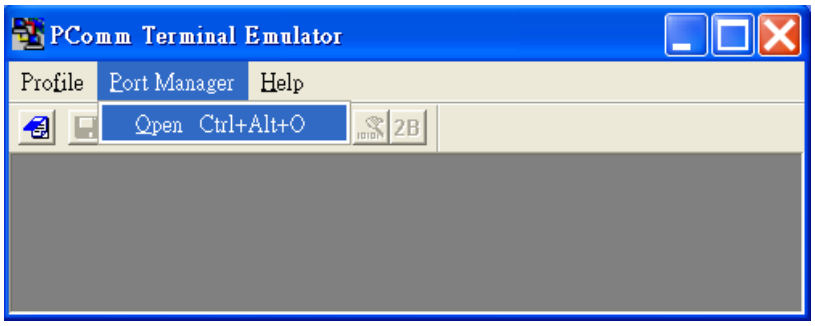
ATTENTION

Do not use the RS-232 console manager when the AWK-5232 is powered at reversed voltage (ex. -48VDC), even though reverse voltage protection is supported.
If you need to connect the RS-232 console at reversed voltage, Moxa's TCC-82 isolator is your best solution.

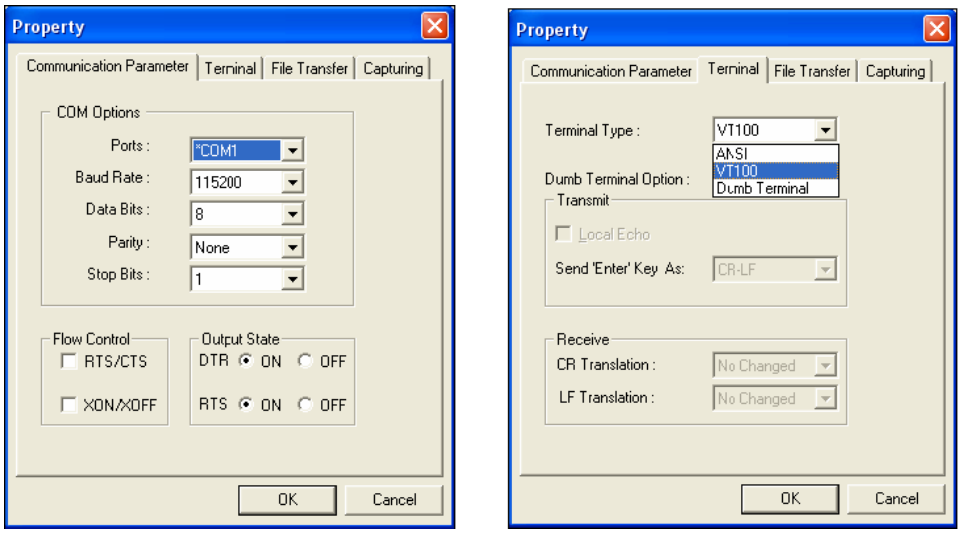
NOTE We recommend using **Moxa PComm (Lite)** Terminal Emulator, which can be downloaded free of charge from Moxa's website.

Before running PComm Terminal Emulator, use an RJ45 to DB9-F (or RJ45 to DB25-F) cable to connect the AWK-5232's RS-232 console port to your PC's COM port (generally COM1 or COM2, depending on how your system is set up). After installing PComm Terminal Emulator, take the following steps to access the RS-232 console utility.

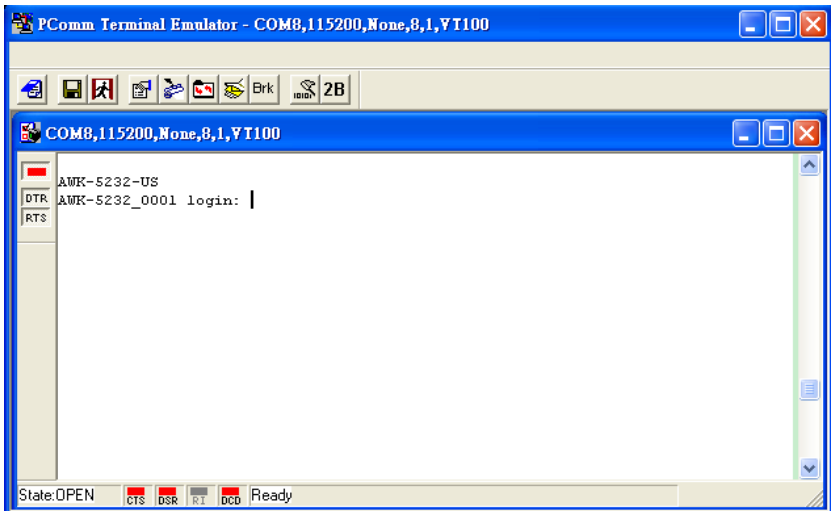
1. From the Windows desktop, open the Start menu and start **PComm Terminal Emulator** in the PComm (Lite) group.
2. Select Open under Port Manager to open a new connection.



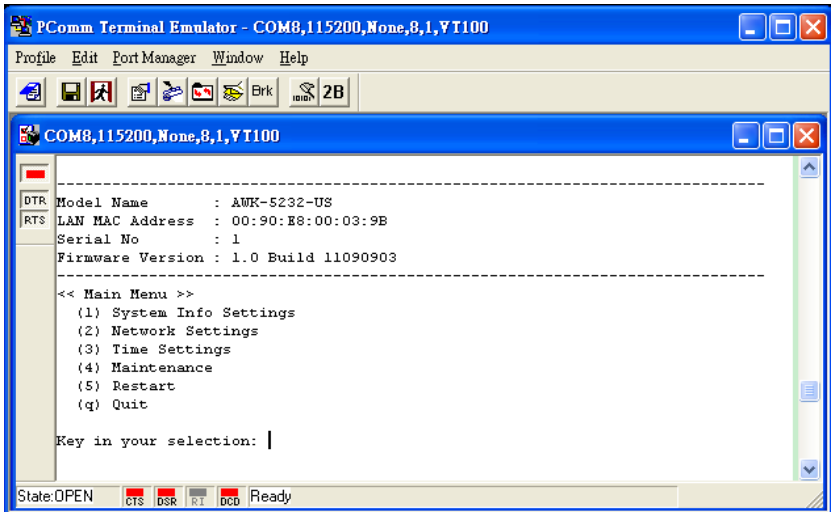
3. The **Communication Parameter** page of the Property window opens. Select the appropriate COM port for Console Connection, **115200** for Baud Rate, **8** for Data Bits, **None** for Parity, and **1** for Stop Bits.



4. Click on the **Terminal** tab, and select **VT100 (or ANSI)** for Terminal Type. Click on **OK** to continue.
5. The Console login screen will appear. Log into the RS-232 console with the login name (default: **admin**) and password (default: **root**, if no new password is set).



6. The AWK-5232's device information and Main Menu will be displayed. Please follow the description on screen and select the administration option you wish to perform.



NOTE To modify the appearance of the PComm Terminal Emulator window, select **Edit → Font** and then choose the desired formatting options.

ATTENTION

If you unplug the RS-232 cable or trigger **DTR**, a disconnection event will be evoked to enforce logout for network security. You will need to log in again to resume operation.

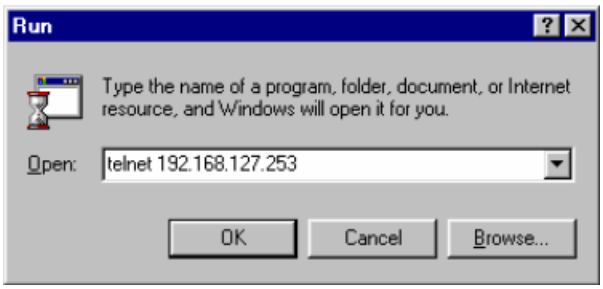
Configuration by Telnet and SSH Consoles

You may use Telnet or SSH client to access the AWK-5232 and manage the console over a network. To access the AWK-5232's functions over the network from a PC host that is connected to the same LAN as the AWK-5232, you need to make sure that the PC host and the AWK-5232 are on the same logical subnet. To do this, check your PC host's IP address and subnet mask.njio ho

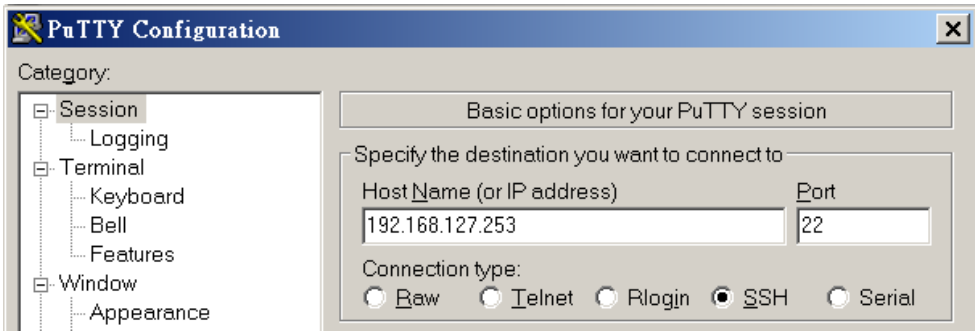
NOTE The AWK-5232's default IP address is **192.168.127.253** and the default subnet mask is **255.255.255.0** (for a Class C network). If you do not set these values properly, please check the network settings of your PC host and then change the IP address to 192.168.127.xxx and subnet mask to 255.255.255.0.

Follow the steps below to access the console utility via Telnet or SSH client.

1. From Windows Desktop, run **Start → Run**, and then use Telnet to access the AWK-5232's IP address from the Windows Run window. (You may also issue the telnet command from the MS-DOS prompt.)



When using SSH client (ex. PuTTY), please run the client program (ex. putty.exe) and then input the AWK-5232's IP address, specifying **22** for the SSH connection port.

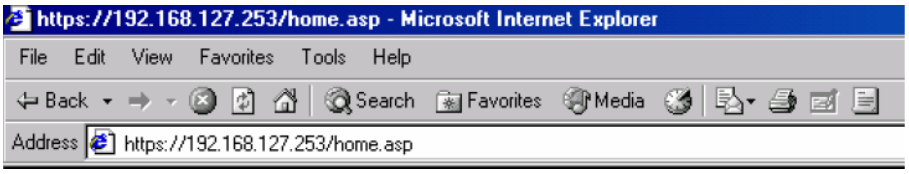


2. The Console login screen will appear. Please refer to the previous paragraph "RS-232 Console Configuration" and for login and administration.

Configuration by Web Browser with HTTPS/SSL

To secure your HTTP access, the AWK-5232 supports HTTPS/SSL encryption for all HTTP traffic. Perform the following steps to access the AWK-5232's web browser interface via HTTPS/SSL.

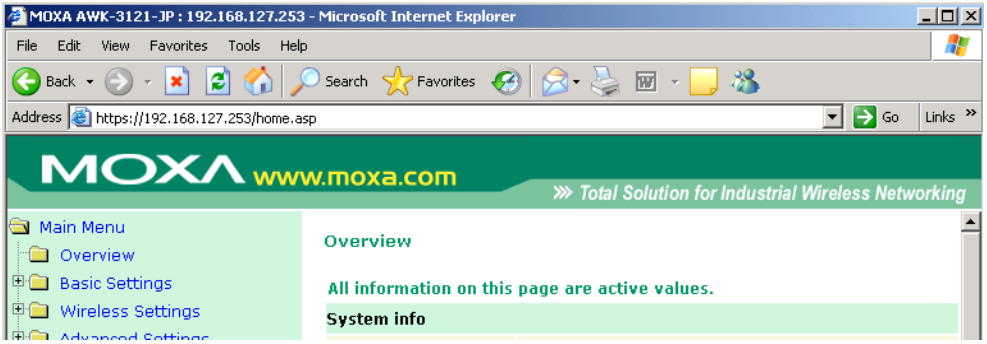
1. Open your web browser and type https://<AWK-5232's IP address> in the address field. Press **Enter** to establish the connection.


https://192.168.127.253/home.asp - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address https://192.168.127.253/home.asp

2. Warning messages will pop out to warn users that the security certificate was issued by a company they have not chosen to trust.

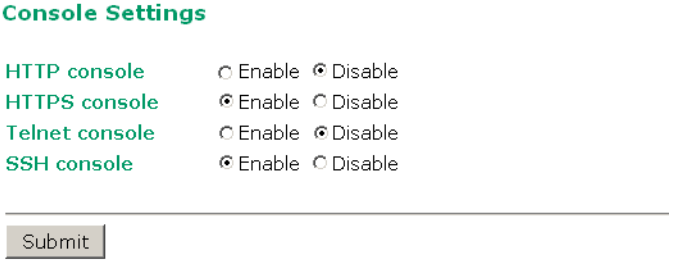
Security Alert
Information you exchange with this site cannot be viewed or changed by others. However, there is a problem with the site's security certificate.
The security certificate was issued by a company you have not chosen to trust. View the certificate to determine whether you want to trust the certifying authority.
The security certificate date is valid.
The security certificate has a valid name matching the name of the page you are trying to view.
Do you want to proceed?
Yes
No
View Certificate

3. Select **Yes** to accept the certificate issued by Moxa IW and then enter the AWK-5232's web browser interface secured via HTTPS/SSL. (You can see the protocol in URL is **https**.) Then you can use the menu tree on the left side of the window to open the function pages to access each of AWK-5232's functions.



Disabling Telnet and Browser Access

If you are connecting the AWK-5232 to a public network but do not intend to use its management functions over the network, then we suggest disabling both Telnet Console and Web Configuration. Please run **Maintenance → Console Settings** to disable them, as shown in the following figure.



6

References

This chapter provides more detailed information about wireless-related technologies. The information in this chapter can help you administer your AWK-5232s and plan your industrial wireless network better.

The following topics are covered in this chapter:

- **Beacon**
- **DTIM**
- **Fragment**
- **RTS Threshold**
- **STP and RSTP**
  - The STP/RSTP Concept
  - Differences between RSTP and STP

Beacon

A beacon is a packet broadcast by the AP to keep the network synchronized. A beacon includes the wireless LAN service area, the AP address, the Broadcast destination address, a time stamp, Delivery Traffic Indicator Maps (DTIM), and the Traffic Indicator Message (TIM). Beacon Interval indicates the frequency interval of AP.

DTIM

Delivery Traffic Indication Map (DTIM) is contained in beacon frames. It is used to indicate that broadcast and multicast frames buffered by the AP will be delivered shortly. Lower settings result in more efficient networking, while preventing your PC from dropping into power-saving sleep mode. Higher settings allow your PC to enter sleep mode, thus saving power.

Fragment

A lower setting means smaller packets, which will create more packets for each transmission. If you have decreased this value and experience high packet error rates, you can increase it again, but it will likely decrease overall network performance. Only minor modifications of this value are recommended.

RTS Threshold

RTS Threshold (256-2346) – This setting determines how large a packet can be before the Access Point coordinates transmission and reception to ensure efficient communication. This value should remain at its default setting of 2,346. When you encounter inconsistent data flow, only minor modifications are recommended.

STP and RSTP

The STP / RSTP Concept

Spanning Tree Protocol (STP) was designed to help reduce link failures in a network, and provide protection from loops. Networks that have a complicated architecture are prone to broadcast storms caused by unintended loops in the network. The STP protocol is part of the IEEE802.1D standard, 1998 Edition bridge specification.

Rapid Spanning Tree Protocol (RSTP) implements the Spanning Tree Algorithm and Protocol defined by IEEE802.1w-2001 standard. RSTP provides the following benefits:

- The topology of a bridged network will be determined much more quickly compared to STP.
- RSTP is backward compatible with STP, making it relatively easy to deploy. For example:
  - Defaults to sending 802.1D-style BPDUs if packets with this format are received.
  - STP (802.1D) and RSTP (802.1w) can operate on the LAN ports and WLAN ports (AP and WDS1-WDS8) of the same AWK-5232.

This feature is particularly helpful when the AWK-5232 connects to older equipment, such as legacy switches.

Differences between RSTP and STP

RSTP is similar to STP, but includes additional information in the BPDUs that allow each bridge to confirm that it has taken action to prevent loops from forming when it decides to enable a link to a neighboring bridge. Adjacent bridges connected via point-to-point links will be able to enable a link without waiting to ensure that all other bridges in the network have had time to react to the change. The main benefit of RSTP is that the configuration decision is made locally rather than network-wide, allowing RSTP to carry out automatic configuration and restore a link faster than STP.

7

Supporting Information

This chapter presents additional information about this manual and product. You can also learn how to contact Moxa for technical support.

The following topics are covered in this chapter:

- **About This User's Manual**
- **DoC (Declaration of Conformity)**
  - Federal Communication Commission Interference Statement
  - R&TTE Compliance Statement
- **Firmware Recovery**
- **Technical Support Contact Information**

About This User's Manual

This manual is mainly designed for, but no limited to, the following hardware and firmware for the AWK-5232:

- Hardware Rev: 1.0
- Firmware Ver: 1.0

You are strongly recommended to visit Moxa's website (http://www.moxa.com) and find the latest product datasheet, firmware, QIG (Quick Installation Guide), UM (User's Manual) and related information.

NOTE You can find out the hardware revision number of AWK-5232 on the side label.

The firmware version number can be seen on the **Overview** page, as follow:

System Info	
Model name	AWK-5232-EU
Device name	AWK-5232_2222
Serial No.	2222
System up time	0 days 00h:02m:20s
Firmware version	1.0 Build 11092116

DoC (Declaration of Conformity)

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: To assure continued compliance, (example – use only shielded interface cables when connecting to computer or peripheral devices). Any changes or modifications not expressly approved by the party

responsible for compliance could void the user's authority to operate this equipment. This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator & your body.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC 15.407(e): Within the 5.15-5.25 GHz band, U-NII devices will be restricted to indoor operations to reduce any potential for harmful interference to co-channel MSS operations.

R&TTE Compliance Statement

This equipment complies with all the requirements of DIRECTIVE 1999/5/CE OF THE EUROPEAN PARLIAMENT AND THE COUNCIL OF 9 March 1999 on radio equipment and telecommunication terminal equipment and the mutual recognition of their conformity (R&TTE).

The R&TTE Directive repeals and replaces in the directive 98/13/EEC (Telecommunications Terminal Equipment and Satellite Earth Station Equipment) as of April 8, 2000.

Safety

This equipment is designed with the utmost care for the safety of those who install and use it. However, special attention must be paid to the dangers of electric shock and static electricity when working with electrical equipment. All guidelines of this and of the computer manufacturer must therefore be allowed at all times to ensure the safe use of the equipment.

EU Countries Intended for Use

The ETSI version of this device is intended for home and office use in Austria, Belgium, Denmark, Finland, France (with Frequency channel restrictions), Germany, Greece, Ireland, Italy, Luxembourg, Portugal, Spain, Sweden, The Netherlands, and United Kingdom.

The ETSI version of this device is also authorized for use in EFTA member states Norway and Switzerland.

EU Countries Not Intended for Use

None.

Potential Restrictive Use

France: only channels 10, 11, 12, and 13.

CE Warning

This is a class B product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Firmware Recovery

When the LEDs of **FAULT**, and **STATE** all light up simultaneously and blink at one-second interval, it means the system booting has failed. It may result from some wrong operation or uncontrollable issues, such as an unexpected shutdown during firmware update. The AWK-5232 is designed to help administrators recover such damage and resume system operation rapidly. You can refer to the following instructions to recover the firmware:

Connect to the AWK-5232's RS-232 console with **115200bps and N-8-1**. You will see the following message shown on the terminal emulator every one second.

```
Press Ctrl-C to enter Firmware Recovery Process........
Press Ctrl-C to enter Firmware Recovery Process........
Press Ctrl-C to enter Firmware Recovery Process........
Press Ctrl-C to enter Firmware Recovery Process........
Press Ctrl-C to enter Firmware Recovery Process........
Press Ctrl-C to enter Firmware Recovery Process........
Press Ctrl-C to enter Firmware Recovery Process........
Press Ctrl-C to enter Firmware Recovery Process........
Press Ctrl-C to enter Firmware Recovery Process........
Press Ctrl-C to enter Firmware Recovery Process........
Press Ctrl-C to enter Firmware Recovery Process........
Press Ctrl-C to enter Firmware Recovery Process........
```

Press **Ctrl-C** and the following message will appear.

Press **Ctrl** - C and the following message will appear.

```
Press Ctrl-C to enter Firmware Recovery Process........
Press Ctrl-C to enter Firmware Recovery Process........
==============================================================================
IP address of AWK-5232 : 192.168.40.155
Netmask of AWK-5222 : 255.255.252.0
Gateway of AWK-5222 : 192.168.43.254
IP address of TFTP server : 192.168.40.142
==============================================================================
1. Start to firmware upgrade using the above network setting immediately.
2. Change the network settings.
Enter your selection :  (1-2,enter for abort):
```

Enter **2** to change the network setting. Specify where the AWK-5232's firmware file on the TFTP server and press **y** to write the settings into flash memory.

```
==============================================================================
1. Start to firmware upgrade using the above network setting immediately.
2. Change the network settings.
Enter your selection :  (1-2,enter for abort): 2

IP address of AWK-5232 : 192.168.1.2
IP address of TFTP server : 192.168.1.1
Netmask of AWK-5232 : 255.255.252.0
Gateway of AWK-5232 : 192.168.1.254
Update RedBoot non-volatile configuration - continue (y/n)? y
```

AWK-5232 restarts, and the "Press Ctrl-C to enter Firmware Recovery Process…" message will reappear. Press **Ctrl-C** to enter the menu and select **1** to start the firmware upgrade process.

```
Press Ctrl-C to enter Firmware Recovery Process........
==============================================================================
IP address of AWK-5232 : 192.168.1.2
Netmask of AWK-5232 : 255.255.252.0
Gateway of AWK-5232 : 192.168.40.142
IP address of TFTP server : 255.255.252.0
==============================================================================
1. Start to firmware upgrade using the above network setting immediately.
2. Change the network settings.
Enter your selection :  (1-2,enter for abort): 1
```

Select **0** in the sub-menu to load the firmware image via LAN, and then enter the file name of the firmware to start the firmware recovery.

```
================================================================================
Load method select :
0. Load from LAN
1. Load from serial with Xmodem
q. Abort
================================================================================
Please select item : 0
Please input file name.
Default file name : AWK-5232.rom
User Input file name : AWK-5232_1.0.rom
```

Technical Support Contact Information

Customer satisfaction is our number one concern, and to ensure that customers receive the full benefit of our products, Moxa Internet Services has been set up to provide technical support, driver updates, product information, certification status, installation guide and user's manual updates.

The following services are provided:

- E-mail for technical support:
  support@moxa.com (Worldwide)
  support@usa.moxa.com (The Americas)
- World Wide Web (WWW) Site for product information:
  http://www.moxa.com